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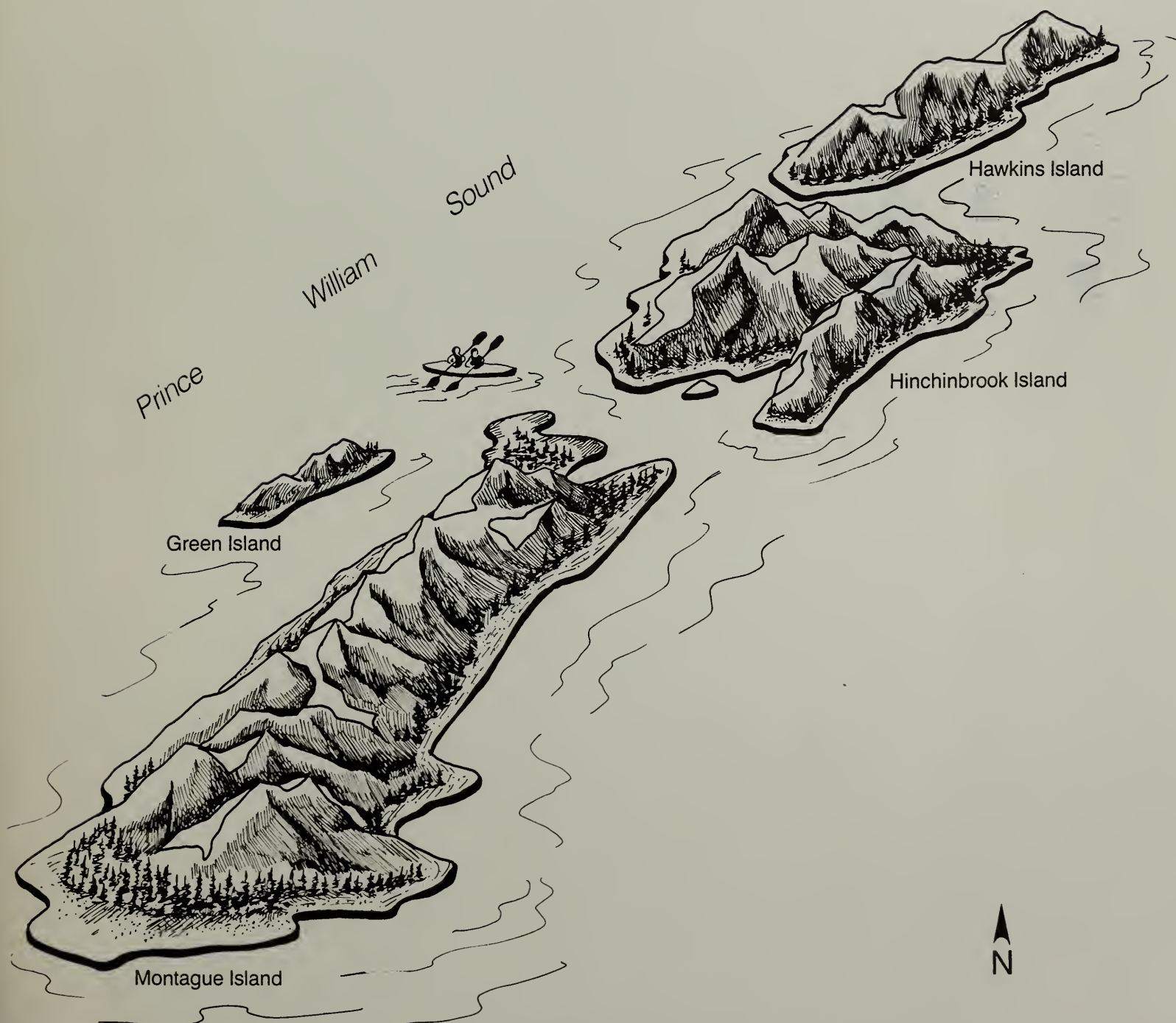


Chugach  
National  
Forest

Administrative  
Document  
Number R-10-MB-54

# Big Islands Management Area

## Draft Environmental Impact Statement



946882

# **Big Islands Management Area**

## **Draft Environmental Impact**

### **Statement**

**U.S.D.A.- Forest Service**  
**Alaska Region**  
**Alaska**

**Chugach National Forest**

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**Comments Must Be**  
**Received:**

**Within 45 days of when Notice of Availability**  
**of this document is published in the Federal Register.**

24 APR 1989



# SUMMARY

## Introduction

This Draft Environmental Impact Statement (DEIS) describes the proposed management activities for the Big Islands Management Area for the ten year period starting in 1986. The purpose of this document is to help the decisionmaker select a set of actions to implement the amended Chugach National Forest Land and Resource Management Plan and to disclose to the public the consequences of those proposed actions and alternatives. This management area includes Hawkins, Hinchinbrook, Montague, Green, Little Green, and Wooded Islands and The Needle all located in the Prince William Sound of southcentral Alaska. The National Forest lands within the management area include approximately 314,000 acres of the 370,000 total acres.

Six alternatives have been proposed for managing the National Forest land and resources. Alternative 5 was selected as the proposed action for implementing Forest Plan direction.

In this summary, the management area, the purpose and need for this document, and issues and concerns about the future management of the area are described. The six alternatives for managing the area are described and the different ways they respond to the issues and concerns are indicated. The comparison of alternatives discloses the most important environmental consequences.

## Management Area

The terrain is made up of low rolling hills and glaciated mountains characterized by steep sideslopes. Streams often form outwash plains and alluvial fans at the mouths of the narrow valleys. Elevations range from sea level to just under 3,000 feet. The marine climate is marked by cool moderating temperatures, high precipitation, and severe storms.

The alluvial fans, outwash plains, and steep sideslopes are generally vegetated by Sitka Spruce forests where they occur at elevations under 500 feet. Slopes at higher elevations and gentle slopes in the rolling hills are normally dominated by muskeg vegetation and mosses.

Wildlife species include Sitka blacktail deer, brown bear, and bald eagle. Anadromous fish are major inhabitants of the lower streams on the islands.

Major attractions of this area are the protected marine inland waters, sheltered bays and coves, wild beauty, remoteness of the islands, and excellent hunting and fishing opportunities. The area is presently unroaded.



## Purpose and Need

The purpose of this EIS is to disclose and discuss the kinds and locations of environmental impacts from proposed activities in the area. The need for this

analysis is based on the amended Forest Plan which requires Management Area Analysis for implementation. In addition, the Forest Service received an application for a special-use permit from Chugach Alaska Corporation for a road across National Forest System land connecting private land at MacLeod Harbor with private land at Patton Bay.

## Forest Plan

The Primary Management Goals for the Big Island Management Area are:

Increase developed and dispersed recreation opportunities

Maintain landscape character

Enhance marine oriented recreation opportunities

Maintain wildlife habitat

Improve fish habitat

As a result of a 1984 appeal of the Chugach National Forest Plan, the Plan was amended in 1986. In the amendment which resolved the appeal, the Forest Service agreed:

to adopt interim management measures to increase assurance that the current character of specific portions of the Forest is maintained (for this management area, Hinchinbrook Island would be managed consistent with Primitive ROS class conditions).

to undertake a series of National Environmental Policy Act-based analyses on the nine Management Areas during the next seven years to supplement existing data and to amend the Forest Plan.

to lower the timber offerings from 16.9 million board feet (mmbf) annually to a level not to exceed 6.3 mmbf for the first five years and 10.6 mmbf for the second five years. (the Big Islands Management Area would contribute 36 mmbf to the timber offering for the planning period).

In addition the Forest has:

1. improved inventories for minerals, recreation, and timber;
2. gathered information on subsistence activities;
3. assessed transportation needs;
4. assessed effects of land selections;
5. assessed the environmental effects of certain proposed management actions;
6. developed standards and guidelines specific to this management area which supplement Forest Plan direction; and
7. developed prescriptions which are specific direction to an individual project or are

## **Planning Process**

The planning process includes identification of issues, collection and interpretation of the data, development of alternatives, estimation of environmental consequences, evaluation of alternatives, and identification of a selected alternative.

## **Issues, Concerns, and Opportunities**

Public comment on future management of the Big Islands Management Area was solicited through newspaper advertisements, public meetings, contact with concerned organizations, agencies, groups, and individuals. Hundreds of opinions and comments were received and analyzed and resulted in the identification of nine central issues and planning questions.

The nine issues and questions are:

1. **Special Uses**

What uses should be allowed under permit on National Forest lands and where should they occur?

2. **Minerals Management**

How should the minerals resource be managed?

3. **Access**

How should access to, and on, the National Forest lands be managed?

4. **Fish Habitat**

How should fish habitat be managed?

5. **Wildlife Habitat**

How should wildlife habitat be managed?

6. **Coordinated Management**

How should the Forest Service coordinate management of the National Forest and private lands?

7. **Timber Management**

How should the timber resource be managed?

8. **Recreation Management**

How should the recreation resource be managed?

9. **Landscape Management**

How should the landscape (the visual resource) be managed?

## **Alternatives**

The process of alternative development began with the scoping of issues, field reconnaissance and data collection by the interdisciplinary team, and the study of existing resource inventories.

### **Alternative 1**

The No Action alternative prescribes that only minimal management activities would occur. These include operation and maintenance of existing Forest Service facilities, administration of existing permits, inventories and feasibility studies.

### **Alternative 2**

Alternative 2 concentrates the resource development on the south end of Montague Island between MacLeod Harbor and San Juan Bay. Present recreational opportunities would be maintained by keeping new recreation development to a minimum and concentrating additional investments into the rehabilitation of existing facilities. Approximately 20.9 million board feet of timber would be offered for harvest, requiring 38.6 miles of roads. Mature forest wildlife habitat on the southeast side of Montague Island, and the San Juan and Nellie Martin River high value stream habitat zones would be protected. Fish habitat feasibility studies could result in 201,400 pounds of fish per year.

Table S-1 lists the proposed projects and outputs by alternative.

### **Alternative 3**

Alternative 3 also concentrates resource development between MacLeod Harbor and San Juan Bay on south Montague Island. New recreation facilities and improved road access would be constructed. Approximately 30.9 million board feet of timber would be offered for harvest, requiring 45.8 miles of roads. Mature forest wildlife habitat on the southeast side of Montague Island would be maintained. The wildlife and fish habitat capability would be maintained in the high value stream habitat zones in the Nellie Martin River area. Harvest in the high value stream habitat zones in San Juan Bay would be limited to protect the braided channel habitat. Fish habitat feasibility studies could result in 201,400 pounds of fish per year.

### **Alternative 4**

Alternative 4 disperses forest management activities around the southern end of Montague Island from MacLeod Harbor to Patton Bay. The developed recreation sites would be increased by the addition of new recreation facilities and by taking advantage of the road to provide access. Approximately 28.6 million board feet of timber would be offered for harvest, requiring 57.6 miles of road. Timber harvest would be restricted in the Nellie Martin River area to reduce the potential impact on the wildlife habitat from the timber harvest on private land in Patton Bay. Wildlife and fish habitat would be maintained in the San Juan and Nellie Martin River high value stream habitat zones. Fish habitat feasibility studies could result in 221,700 pounds of fish per year.

### **Alternative 5**

Alternative 5 proposes high levels of management activities for all resources on south Montague Island, with a significant emphasis on the recreation resource. It recognizes the potential of Prince William Sound for recreation and tourism. Developments would



be directed to either the Forest Service-permitted lodge at MacLeod Harbor or partnerships with private interests to provide tourist facilities. The Forest Service would develop cultural resource interpretation sites.

Approximately 35.9 million board feet of timber would be offered for harvest, requiring 62.3 miles of road. Timber harvest would be limited in mature forest wildlife habitat in the Nellie Martin River area. To protect the braided channel habitat in the high value stream habitat zones in the San Juan and Nellie Martin River area, timber harvest would be limited. Fish habitat feasibility studies could result in 221,700 pounds of fish per year.

### **Alternative 6**

Alternative 6 proposes development of south Montague Island with high levels of forest management activities for all resources. Forest management activities would be dispersed around the south end of Montague Island from MacLeod Harbor to Patton Bay. Approximately 36.5 million board feet of timber would be offered for harvest, requiring 64.3 miles of road. Timber harvest in the San Juan Bay and Nellie Martin River high value stream habitat zones would be limited to areas without substantial braided channel habitat. The amount of developed recreation would increase through the addition of new facilities and by taking advantage of the road to provide access to the south end of Montague Island. Fish habitat feasibility studies could result in 221,700 pounds of fish per year. (Table S-1)

Table S-1

Big Islands Management Area  
Activities, Outputs and Effects

|   |                 | Alternatives |        |        |        |        |        |
|---|-----------------|--------------|--------|--------|--------|--------|--------|
| OUTPUTS/ACTIVITIES                          | Units           | 1            | 2      | 3      | 4      | 5      | 6      |
| Total Road                                  | Miles           | 0            | 38.6   | 46.0   | 57.6   | 62.3   | 64.3   |
| Total Road Cost                             | Million Dollars | 0.00         | 4.65   | 5.60   | 6.99   | 7.56   | 7.86   |
| Nonmotorized Trail                          | Miles           | 0            | .25    | 6.0    | 14.0   | 26.25  | 11.75  |
| Motorized Trail                             | Miles           | 0            | 0      | 0      | 0      | 7      | 0      |
| Trail Head Parking                          | Number          | 0            | 0      | 3      | 6      | 7      | 7      |
| Salt Water Access                           | Number          | 0            | 0      | 3      | 3      | 3      | 3      |
| Anchor Buoys                                | Number          | 0            | 1      | 1      | 1      | 1      | 1      |
| LTF National Forest                         | Number          | 0            | 1      | 1      | 0      | 0      | 0      |
| LTF Private Lands                           | Number          | 2            | 2      | 2      | 1      | 1      | 1      |
| Air Strip Studies                           | Number          | 0            | 0      | 2      | 2      | 5      | 2      |
| Fisheries Studies                           | Number          | 4            | 8      | 8      | 14     | 14     | 14     |
| Fish Produced per year                      | Pounds          | 0            | 201400 | 201400 | 221700 | 221700 | 221700 |
| Timber Volume                               | MMBF            | 0            | 20.9   | 30.9   | 28.6   | 36.0   | 36.5   |
| Total Area Harvested                        | Acres           | 0            | 777    | 1,014  | 999    | 1,151  | 1,219  |
| Timber Sale Net Value                       | Thousand        | 0            | -1,242 | -570   | 527    | 1,239  | 971    |
| Rec. Use Increase                           | RVD             |              | 1,934  | 3,646  | 6,266  | 28,630 | 6,108  |
| Tent Platform/Shelter                       | Number          | 0            | 0      | 1      | 3      | 3      | 3      |
| New Cabins                                  | Number          | 0            | 2      | 2      | 2      | 8      | 2      |
| EFFECTS                                     |                 |              |        |        |        |        |        |
| Visual Quality Obj.<br>not met-Montague Is. | Acres           | 1764         | 2076   | 2174   | 2058   | 2068   | 2072   |
| Present Value                               | Thousand        |              |        |        |        |        |        |
| All Resources                               | Dollars         | 1418         | -325   | -238   | -3     | 190    | 295    |

## **Comparison of Alternatives**

This section presents comparisons of the alternatives by issue. Refer to Table S-1 in the previous section for comparison of projects and outputs by alternatives.

### **Issue #1 - Special Uses**

The management areawide Standards and Guidelines provide additional direction for the management of activities that require special use permits. These Standards and Guidelines do not vary between alternatives. Outfitter/guide capacity, as measured in terms of campsites, was evaluated and remains the same for all alternatives. The increased access and facilities proposed in Alternative 5 could result in more recreation special use permits.

### **Issue #2 - Minerals Management**

The National Forest would respond to requests for exploration and development of minerals in the same manner in each alternative. Guidance would be provided in the standards and guidelines. Improved access to south Montague provided in Alternatives 2 through 6 may create an interest in minerals exploration and development. However, current information shows a low potential for minerals development on the island.

### **Issue #3 - Access**

All alternatives, except the no action alternative, increase access for recreation, timber and fisheries management. Alternatives 4 through 6 also provide for coordinated access management with adjacent private landowners. The proposed arterial road could be constructed independent of Forest Service management activities and could provide indirect opportunities for National Forest management activities such as a feasibility study for fish improvements.

Alternatives 2 and 3 would require one log transfer facility to be built on National Forest System land and possibly two additional facilities on private land. Development of the road system in Alternatives 4 through 6 would require only one log transfer facility which would be built on private land at MacLeod Harbor. This would reduce the effects on the marine environment since fewer log transfer facilities would be required.

### **Issue #4 - Fish Habitat**

Fish habitat on Hinchinbrook, Hawkins and Green Islands would not be affected by proposed management activities under any of the alternatives.

Timber harvest and roading activities would affect six fish streams on the south portion of Montague Island under Alternatives 2 and 3, and 13 fish streams under Alternatives 4, 5, and 6.

The proposed management activities would not significantly impact populations of aquatic Management Indicator Species or the aquatic habitat capability of streams within the Big Islands Management Area under any of the action alternatives.

Opportunities for fish habitat enhancement would be studied in all alternatives with the greatest potential being in Alternatives 4 through 6.



### **Issue #5 - Wildlife Habitat**

The proposed management activities would not significantly impact the habitat capability of any of the Management Indicator Species within the Big Islands Management Area under any of the action alternatives.

Wildlife habitat on Hinchinbrook, Hawkins and Green islands would remain unchanged and would continue to provide habitat capability under all alternatives.

The habitat capability to support deer under severe winter conditions on Montague Island would be unchanged under Alternative 1 and reduced from 2 to 4 percent under the action alternatives.

Habitat capability for brown bears would be affected by the removal of 2 to 7 percent of the riparian/beach fringe habitat on Montague Island in the action alternatives. The potential for adverse impacts to brown bears from improved road and trail access and increased human activity is greatest under Alternative 5, followed by alternatives 6, 4, 3, 2 and 1.

Alternative 5 proposes the greatest amount of forest roading within 1/2 mile of eagle nests followed by alternatives 6, 4, 3, and 2, respectively. Only one eagle nest is within or adjacent to a proposed harvest unit (Alternatives 2 and 3). All nests will be protected by establishing and maintaining a 330' windfirm buffer around each nest.

### **Issue #6 - Coordinated Management**

Alternative 1 does not respond to the issue of coordinated management.

Alternatives 2 and 3 propose access systems that serve only National Forest system resources. National Forest management activities would be conducted away from the private lands reducing cumulative effects over what would occur in Alternative 4 through 6. Alternatives 4, 5, and 6 provide for a jointly developed access system.

Alternative 5 identifies opportunities to coordinate recreation facilities and services between the Forest and private landowners.

### **Issue #7 - Timber Management**

Timber management would not occur under Alternative 1. Alternatives 2 through 6 concentrate all timber harvest on the southern portion of Montague Island. Acres brought under management range from 777 to a maximum of 1219, resulting in a volume offered for sale that ranges from 20.9 to 36.5 mmbf.

With a cost-share agreement, Alternative 4, 5, and 6 result in a positive appraised net value, with Alternative 5 providing the greatest appraised value.

### **Issue # 8 - Recreation Management**

For all action alternatives, primitive conditions are maintained over the entire management area with the exception of the south end of Montague Island. As a result road access provided under Alternatives 2 through 6, there is a slight shift from primitive to motorized recreation opportunities.

Hunting and fishing opportunities increase the most in Alternatives 4, 5 and 6.

Recreation facilities and services increase in Alternatives 3 through 6 with Alternative 5 providing the most significant increase. This results in a corresponding increase in recreation use (Table S-1).

### **Issue #9 - Landscape Management**

The major impact on the visual resource is a decrease in the natural character of the landscape due primarily to timber harvest and road construction. For all alternatives, that decrease is relatively small in the context of the entire management area, since those activities would be concentrated on the south end of Montague Island.

## **Other Environmental Effects**

### **Roadless Character**

Alternative 1 would not alter the roadless character. Alternatives 2 and 3 would result in approximately 23,600 acres of National Forest land being changed to a roaded character. Alternatives 4, 5, and 6 would result in approximately 54,500 acres being changed to a roaded character.

### **Soil and Water**

Development activities in Alternative 2 through 6 could increase mass movement and surface soil erosion resulting in stream sedimentation. Standards and Guidelines will be applied to reduce the potential for this to occur.

### **Subsistence**

The impacts of all action alternatives including reasonably-foreseeable future and planned activities, would not significantly impact subsistence use.

### **Social and Economic**

Road development and timber harvest activities would increase the opportunities for roaded recreation. These activities would alter fish and wildlife habitat and visual quality. Timber harvest on public and private lands in the project area will impact dispersed recreation use and roadless attributes.

Alternatives 1, 5, and 6 generate a positive present net value while Alternatives 2 through 4 are negative.



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# **Chapter 1**

## **Purpose and Need**





# Chapter 1

## Purpose and Need

### INTRODUCTION

The purpose of this Draft Environmental Impact Statement (DEIS) is to disclose, the effects of alternative actions for the Big Islands Management Area under the direction of the Chugach National Forest Land and Resource Management Plan as amended. This document is presented to the public for their review and comment. Unless specifically noted, the existing management direction in the amended Forest Plan is applicable.

The need for the Management Area Analysis (MAA) and an Environmental Impact Statement (EIS) for the Big Islands Management Area arises from: actions proposed in the amended Chugach National Forest Land and Resource Management Plan (Forest Plan); and a request for access by the Chugach Alaska Corporation (CAC) to its lands on Montague Island. Under the provisions of the National Environmental Policy Act (NEPA), this document is tiered to the existing amended Forest Plan and the EIS.

Management area analysis takes the Forest Plan goals and guides those who conduct the day-to-day business of the Forest Service. An interdisciplinary team developed the alternative arrays of projects in response to the issues, concerns, opportunities and the goals and primary management practices outlined in the amended Forest Plan. Six alternatives were developed with the assistance of interested individuals and organizations. Each alternative would affect the environment differently, provide different recreation, wildlife, fish and timber opportunities; require different expenditures; and pose different implications for the local economies.

Planning process records are available at the Supervisor's Office of the Chugach National Forest, 201 East Ninth Avenue, Anchorage, Alaska.

### Forest Plan Direction

The Chugach National Forest Land and Resource Management Plan as amended in 1986 established the management direction for the Big Islands Management Area. The Primary Management Goals and Primary Management Practices identify the overall objectives for the area. More specific direction for project implementation is provided in the forestwide and analysis area standards and guidelines.

The Primary Management Goals for the Big Island Management Area are to:

Increase developed and dispersed recreation opportunities

Maintain landscape character

Enhance marine-oriented recreation opportunities

Maintain wildlife habitat

Improve fish habitat

The Primary Management Practices for the Management Area are:

Develop a marine recreation system

Construct and maintain cabins and marine recreation facilities

Harvest timber and reforest

Improve commercial fish habitat

The amended Forest Plan estimated the average annual outputs for the Big Island Management Area between 1986 and 1990. They are:

5,000 Recreation Visitor Days of developed recreation

25,000 Recreation Visitor Days of dispersed recreation

0 Acres of wilderness

0 Recreation Visitor Days in wilderness

2,000 Wildlife-related Recreation Visitor Days

0 Acres of wildlife habitat improvement

1,000 Sportfish related Recreation Visitor Days

6,000,000 Pounds of commercial fish produced

3,600,000 Board feet of timber

0 Mining plans of operations in effect

370,000 Acres available for mineral prospecting and development

As a result of a 1984 appeal of the Chugach National Forest Plan, the Plan was amended in 1986. Four broad actions were agreed upon by the Forest Service and the appellants:

1. The Forest Service agreed to adopt interim management measures to increase assurance that the current character of specific portions of the Forest is maintained. (For this management area, Hinchinbrook Island would be managed consistent with directions for the Primitive Recreation Opportunity Spectrum (ROS) class until the Forest Plan is revised.) (See Appendix A).

2. The Forest would undertake a series of National Environmental Policy Act-based analyses on nine management areas during the next seven years to supplement existing data and to amend the Forest Plan.

3. The Forest agreed to lower the timber offerings from 16.9 million board feet (MMBF) annually to a level not to exceed 6.3 MMBF for the first five years and 10.6 MMBF for the second five years. The Big Island Management Area would contribute 36 MMBF to the timber offering for the planning period.

4. The appellants agreed to participate in the accomplishment of these steps and not to initiate or pursue any further direct appeal or judicial review of the Chugach Forest Plan. The agreement did not affect any prior existing rights of the appellants.

### **Chugach Alaska Corporation Request**

The Forest Service received an application for a special-use permit from Chugach Alaska Corporation for a road across National Forest System land connecting private land at MacLeod Harbor with private land at Patton Bay. The road would be used to transport timber harvested from the Patton Bay private land to a log transfer facility at MacLeod Harbor. It was agreed that the request would be evaluated as part of the Management Area Analysis.

### **Decision to be Made**

The decision to be made by this management area analysis is to determine what mix of activities best implements the management direction provided in the Forest Plan. The decision will select an alternative that contains projects the Forest Service would implement, consistent with the budgetary process, during the life of the Forest Plan (1986-1996).

The need for the management area analysis and an environmental impact statement (EIS) for the Big Islands Management Area arises from: actions proposed in the amended Chugach National Forest Land and Resource Management Plan (Forest Plan); and a request for reasonable access by the Chugach Alaska Corporation (CAC) to its lands on Montague Island. Under the provisions of the National Environmental Policy Act (NEPA), this document is tiered to the existing amended Forest Plan and the EIS.

The management area analysis takes the Forest Plan goals and gives specific guidance to those who conduct the day-to-day business of the Forest Service. Using the Forest Plan goals, an interdisciplinary team of Forest Service staff developed the alternative arrays of projects in response to the issues, concerns and opportunities for the management area. The goals and primary management practices outlined in the Forest Plan and the Settlement Agreement amendment guided the formulation of those alternatives. Six alternatives were developed with the active assistance of many interested individuals and organizations. Each alternative would affect the environment differently, provide different recreation, wildlife, fish and timber opportunities; require different expenditures; and pose different implications for the local economies. Each alternative would provide specific direction for the management area in response to concerns identified in the Settlement Agreement and subsequent scoping.

### **Overview of the Management Area**

The Big Islands Management Area is located in Prince William Sound. This 370,000-acre management area, which was established by the Forest Plan, includes Hawkins, Hinchinbrook, Montague, Green, Little Green, The Needles, and Wooded islands. (See Map 1.) Lands within the management area are administered by the Chugach National Forest, the State of Alaska, Chugach Alaska Corporation (CAC), Eyak Corporation, and the U. S. Department of Transportation. The 314,041 acres of National Forest System



land within the management area are administered by the Cordova Ranger District in Cordova, Alaska. (Map 1)

## **Public Participation**

The Chugach National Forest, as part of its commitment to "Caring for the Land and Serving People," has sought and included public comment on its planning for forest management. Information, comments, and assistance have been sought from Federal, State, and local agencies and other individuals and organizations who may be interested in or affected by actions considered by the Forest. The information from these publics has been used in preparation of this environmental impact statement.

The Chugach National Forest began its public involvement for the Gravina Management Areas with public open houses in May 1986. The focus of those meetings was on the Gravina Management Area Analysis, but the public also commented on issues pertinent to the Big Islands Management Area Analysis. The management area analysis for Gravina was interrupted in 1987 by the need to address the spruce beetle infestation on the Kenai Peninsula portion of the Forest. Upon completion of that examination, Forest personnel returned their attention to the Gravina MAA and added the Big Islands to the MAA. Dalton Du Lac, Forest Supervisor, in a June 1987 letter, invited further comment from the public. Responses to that letter, together with the previous comments, were analyzed to build the list of Issues, Concerns and Opportunities that have guided the development of MAA alternatives. A Notice of Intent, published in the Federal Register in October 1987, described the Forest Service's plan to prepare an EIS for Gravina and Big Island Management Areas. A newsletter was distributed in February 1988 to inform the public about the Management Area Analysis process, the schedule for MAA, and the issues.

The Forest Service, in a subsequent Notice of Intent, October 1988, separated the Big Islands Management Area draft environmental impact statement (DEIS) from the Gravina Management Area DEIS. The two areas were separated after scoping showed they were distinct in terms of management activities proposed for the areas and issues identified by the public. They are two distinct geographic areas that lend themselves to separate analysis.

In addition to the public meetings and comments received in response to the scoping letter and newsletter, Chugach National Forest personnel have met individually with potentially affected groups and individuals. These contacts have been to inform the groups and individuals as well as to provide further information to the Forest Service.

The scoping process has included:

1. Identification of potential issues, concerns and opportunities (ICO).
2. Identification of ICOs to be analyzed in depth.
3. Exploration of alternatives.
4. Identification of potential environmental effects of the proposed action and alternatives.

5. Determination of other government agencies to be consulted, and what form of consultation and cooperation would be appropriate.

### **Summary of Public Comments**

Comments represented the full spectrum of public opinion, ranging from those favorable to extensive development to those favoring preservation. Comments centered on the effects of Forest management activities on the character of the management areas. On the other hand there was concern for development that would contribute to a healthy, diverse local economy.

Public comments about private use of the Forest by outfitter/guide operations were generally supportive. Comments also supported the Forest Service taking an active role in management of a variety of other special uses.

Generally, most comments about minerals development have been positive, but include expectations for environmental protection through prudent resource management.

Comments on access concerned access across National Forest system and private lands for recreation, timber and general access; roads around South Montague Island for timber transport; and limiting access to the minimum necessary to meet objectives.

A broad range of concern has been voiced regarding natural fish production, habitat protection, impacts of timber harvest and other development, fisheries enhancement and aquaculture, wildlife transplants and population control.

A broad range of respondents expressed concern about National Forest management relative to planned activities on private lands. Concern was expressed regarding cumulative effects on wildlife habitat resulting from timber harvest and other developments, both private and National Forest.

Some comments assumed that private lands would be developed or harvested and that the National Forests would be retained as a reservoir. Other comments have expressed a desire to defer timber harvest on National Forest lands during the same period as the private harvests.

Comments were received about the economic aspects of possible timber harvest. There was concern for the impact of current timber markets and about National Forest competition with privately owned timber. General concern was voiced about below-cost timber sales. Concern was expressed that the Forest Service's planning process is driven by timber production. Other comments expressed a desire to have National Forest timber as part of the supply to meet the needs of local industry.

Comments were divided between those favoring recreation development and others preferring a more natural character for the management area. The many users have expressed widely differing needs and desires for how the Forest Plan goals will be carried out. The public has commented on the increase in litter along beaches and around recreation areas, and expressed a desire that such impacts be considered.



The public expressed concern about potential visual impacts by timber, mining and other developments. Comments were received about the impacts on the visual resource important for marine recreation use.

## ISSUES

Public comments and management concerns were used to develop the following issue statements. These public comments and management concerns include opportunities for a variety of resource management activities. The scoping process identified nine issues to be addressed. These issues were used to formulate alternatives and to analyze the environmental consequences of the actions.

### 1. Special Uses

#### *Issue Statement*

What uses should be allowed on National Forest lands and where should they occur?

#### *Current Situation*

There are many activities that may be conducted under permit on National Forest System lands. They include: outfitter/guides, lodges, tent platforms, subsistence camps, electronics sites. Within the Big Islands there are outfitter/guides, a lodge, residences, electronic sites, and navigation aids under permit. In addition, other facilities and services have been suggested during the scoping process to include summer home sites, lodges, refueling stations, and upland support facilities for a variety of marine activities to meet the needs of growing tourism and recreation in Prince William Sound.

Forest Plan direction provides guidance for certain special uses but is silent on others. Most direction is contained in the forest wide Standards and Guidelines under recreation, lands (special use management - non-recreation), and facilities. Forest Service policy states that development of National Forest System lands will complement rather than compete with uses of adjacent private lands. National policy encourages the Forest to develop new partnerships to increase recreation opportunities and to contribute to the diversity of local economies.

#### *Analysis Questions*

What kinds of and how many special uses should be allowed in the Big Islands Management Area?

Where should these uses be allowed in the Big Islands Management Area?

What effects do these uses have on the Big Islands Management Area resources, including subsistence?

#### *Goal*

Provide further direction for determining what types and levels of services and facilities should be allowed under special use permit on the National Forest-administered lands in the Big Islands Management Area.

#### *Key Indicator*

Does the alternative provide direction to manage special uses? A process will be provided for screening and evaluating special use applications.

## 2. Minerals Management

### *Issue Statement*

How should the minerals resource be managed?

### *Current Situation*

The Forest Plan calls for "orderly development of the minerals resource" with the comment that "National need for minerals will require the Forest to supply more in the future than it does at present." Forest wide Standards and Guidelines direct this program.

The entire Big Islands Management Area is currently open for mineral entry and development. The amended Forest Plan requires the Forest to provide additional information on minerals, and to consider, to the extent practical, measures to mitigate environmental impacts from mining, including the potential need to withdraw areas from mineral entry and development.

### *Analysis Questions*

What is the potential for mineral development in the Big Islands Management Area?

Where are the minerals resources located in the Big Islands? Where are mining activities currently being carried out, and where might future mineral activities be located?

How will mineral development impacts be mitigated, including consideration for mineral withdrawal recommendations?

### *Goal*

To the extent practicable, identify in reasonable detail:

1. Current and projected future location and level of development of active mining claims, patented or unpatented.
2. Location of probable occurrences of substantial deposits of locatable, leasable, and common variety minerals.
3. Current and projected future access needs for exploration and development of active mining claims and areas of probable mineral occurrence.
4. Potential environmental effects of current and projected future exploration and development.

Provide information on exploration, development and management of the mineral resource in the Big Islands Management Area and consider the need for withdrawals.

### *Key Indicator*

Does the analysis provide the minerals information as required by the amended Forest Plan?

## 3. Access

### *Issue Statement*

How should access to and on National Forest lands be managed?

### *Current Situation*

Currently, access to the Big Islands is by water and air. Access needs exist for development and management of Forest and private land resources. Forest wide Standards and Guidelines call for completion of "a Forest wide transportation analysis for the implementation of the Plan, considering access proposed by other entities, which in-



cludes various types of travel routes and associated easements." Guidelines also call for the Forest to request, process, and complete other actions necessary to cross State and private lands including actions under Alaska Native Claims Settlement Act (ANCSA) 17(b) and the 1982 Settlement Agreement with Chugach Natives Inc. (now Chugach Alaska Corporation) to connect their holdings in MacLeod Harbor and Patton Bay.

## *Analysis Questions*

What resources in the Big Islands Management Area are currently accessible and where should new access be provided?

What types of new access will be provided? Is there an opportunity to coordinate access with the private landowners on Montague Island?

How and where will access rights-of-way be identified for Forest users?

What are current and future access needs for exploration and development of active mining claims and areas of probable mineral occurrence?

If roads are constructed, how will use be managed?

## *Goal*

Provide for access to and on the National Forest lands in the Big Islands Management Area that best meets the needs of Forest users.

## *Key Indicator*

Does each alternative provide access for management of all resources and forest visitors and users? Does each alternative meet transportation needs of adjacent landowners? How cost effective is each alternative transportation plan?

## 4. Fish Habitat Management

### *Issue Statement*

How should fish habitat be managed?

### *Current Situation*

The amended Forest Plan authorizes fish habitat improvement projects resulting in pounds of fish to provide for sportfishing and commercial needs. Forest wide Standards and Guidelines describe the four categories of enhancement projects that will be carried out and provide for cooperation with the Alaska Department of Fish and Game (ADF&G) and aquaculture associations in development of these projects.

### *Analysis Questions*

What opportunities exist for improvement of fish habitat?

Where can feasible fisheries projects be located in the Big Islands Management Area?

How many fish projects will be carried out?

How will fish habitat be protected?

What opportunities exist to increase sportfishing as measured in wildlife fish user days (WFUD)?

Goal

Maintain and improve fish habitat, minimize effects on existing fish habitat and provide additional suitable habitat to enhance commercial and sportfishing opportunities.

Key Indicator

To what extent does each alternative maintain or improve fish habitat, as measured by pounds of fish, WFUDs, and affect Management Indicator Species habitat?

## 5. Wildlife Habitat Management

Issues Statement

How should wildlife habitat be managed?

Current Situation

The Big Islands Management Area supports many species of wildlife. While the Forest Plan does not call for wildlife habitat enhancement, it does contain a Primary Management Goal to "maintain wildlife habitat."

Analysis Questions

How will habitat be managed and capability maintained in the Big Islands Management Area?

What feasible opportunities exist for wildlife habitat improvement?

What opportunities, appropriate to the recreation setting, exist to increase wildlife user days?

Goal

Maintain habitat capability of Management Indicator Species and increase use of wildlife resources.

Key Indicators

How is habitat capability affected for Management Indicator Species?

To what extent does each alternative increase wildlife user days?

## 6. Coordinated Management of National Forest System and Other Lands

Issue Statement

How should the Forest Service coordinate management of the National Forest in relation to non-National Forest lands?

Current Situation

The management area contains a mixture of land ownerships and associated management activities. A Primary Management Practice under the Forest Plan directs that the Forest "Coordinate management practices with adjacent landowners." Forest wide Standards and Guidelines direct that the Forest "seek ways to complement development of lands of other ownership" in development of the recreation resource.

In addition, the Forest is to "Direct private or commercial recreation development to private lands ...." and to "Encourage development on private land to meet the demand for summer homes, resorts, other accommodations and commercial public services."

The MAA must analyze the effects of Forest Service management in combination with that of the other landowners in the area. This means that the Chugach National Forest will examine the plans that exist for the development of those non-National Forest lands, estimate the intensity of that development, and determine the cumulative effects of those activities and the activities on National Forest System lands.

## Analysis Questions

What opportunities for coordination exist and how will they be pursued?

How would the Forest Service coordinate management of the Big Islands Management Area with the management of adjacent lands in other ownerships?

## Goal

Coordinate management of National Forest lands with the management of non-National Forest lands in the Big Islands Management Area, recognizing both public and private needs and disclosing cumulative effects.

## Key Indicator

The alternatives will be judged on how well they provide for coordination with management of non-National Forest land.

## 7. Timber Management

### Issue Statement

How should the timber resource be managed?

### Current Situation

A Primary Management Practice for the management area is to "Harvest timber and reforest." The amended Forest Plan estimated a 3.6-million-board-feet (MMBF) harvest per year. The Plan also permits other silvicultural practices and provides standards and guidelines for those practices.

### Analysis Questions

Where, when and how would timber sale offerings occur in the management area?



How can the Forest Service best make timber sales in the management area cost efficient?

How can the Forest Service manage timber resources consistent with other resources?

## Goal

Offer timber for sale to local industry, while coordinating that offer in such a way that other resource opportunities may be addressed and/or enhanced. Address cost efficiency of timber harvesting in the management area.

## Key Indicator

What will be the timing and location of timber sale offerings in relation to sales by other landowners?

What will be the cost efficiency as measured by present net value, timber sale volume offered, and benefit to cost?

## 8. Recreation Management

### Issue Statement

How should the recreation resource be managed?

### Current Situation

The Forest Plan estimates the expected recreation outputs for the management area in terms of visitor days. Primary Management Goals for the management area call for the Forest to:

"Improve (also enhance) marine oriented recreation opportunities",

"Maintain dispersed recreation opportunities;" and

"Increase developed and dispersed recreation opportunities".

Primary Management Practices call for the Forest to develop a marine recreation system (specific locations are named in the plan for evaluation for feasibility) and to "Construct and maintain cabins and marine recreation facilities" (numbers of cabins, anchor buoys and tent platforms are laid out in the Plan; however, locations are not included).

The Forest Plan proposes a number of recreation projects to bring this about. The Forest Plan Standards and Guidelines call for the implementation of the Recreation Opportunity Spectrum (ROS) to be utilized as a guideline for displaying on the ground recreation objectives. The classifications under this system need to be integrated with other resource activities.

### Analysis Questions

How will the recreation goals for the Big Islands Management Area be carried out?

Where will recreation opportunities be provided?

What will be the role of the Big Islands Management Area in providing recreation opportunities relative to those that may be provided by adjacent land owners?

How can the Forest integrate the ROS classification system with the other proposed management activities?

## Goal

Provide a recreation setting that will meet the needs of the current and future National Forest customers. Provide opportunities for State and local governments, private organizations (both profit and non-profit), and interested individuals to work in partnership to expand and enhance recreation opportunities in the Big Islands Management Area.

## Key Indicators

What location, type and amount of new recreation facilities, programs and services will be provided by the Forest Service and other parties, as reflected by projected increases in Recreation Visitor Days (RVD's).

How many acres would be managed for each ROS class?

## 9. Landscape Management

### Issue Statement

How should the landscape (the visual resource) be managed?

### Current Situation

Provisions for management of the visual resource are contained in the Forest Plan. Direction in the plan is to "Maintain landscape character." Forest wide Standards and Guidelines also state that visual quality objectives (VQO) are adopted for use on the Forest. Based on this direction, the MAA would address integration of landscape management with other resource management activities for the management area.

### Analysis Questions

What is the best way to implement prescribed management activities while maintaining landscape character?

How can the Forest integrate the adopted Visual Quality Objectives and the goals for other management activities in the Big Islands Management Area?

## Goal

Integrate landscape management objectives into multiple-use management activities.

## Key Indicators

Evaluate visual quality based on:

The number and location of acres in each visual condition class resulting from implementation of each alternative.

The number and location of acres that would be managed under each Visual Quality Objective under each alternative.

## Issues Not Addressed in the Planning Process:

**Cultural Resources Management:** Cultural resources were mentioned as a "non-renewable resource" which required proper planning so that irreversible damage would not occur.

Federal law sets out requirements for protecting cultural resources. These requirements are reflected by direction for cultural resources management in the Standards and Guidelines.

**Planning Process:** Public comments have asked that the planning process and project proposals meet legitimate resource needs, meet public needs and be economically sound.

The public comments about the planning process were not tracked as an issue but are answered through this management area analysis.

**Wilderness:** Some people would like to see a wilderness designation in the Big Islands management area.

Allocation of Wilderness is outside of the scope of the decision to be made. It is a Forest allocation that may be addressed if it is an issue at the time of the Forest Plan revision.

**Below-Cost Timber Sale:** Some individuals are concerned that the cost of preparing, offering, and administering timber sale contracts is more than the revenues received by the Federal Treasury.

Below cost sales only compare dollars spent with dollars received and make no allowances for the many other benefits that sales accrue to the public. Our analysis incorporates information on total costs and revenues of the timber program as well as affects on local economies during the planning period. The analysis also incorporates benefits and costs for all resources as a result of implementing the proposed alternatives.

## Additional Chapters

In Chapter II, alternatives for addressing or resolving the analysis questions are described and compared. Different alternatives are displayed in a format which allows comparison of the environmental impacts of each alternative and how each of the identified issues is addressed. Measures are identified to mitigate potential environmental impacts and their effectiveness are discussed. The proposed action is identified in Chapter Two.

In Chapter Three, the Affected Environment, existing land, resources and socio-economic characteristics pertaining to the management area are described.

In Chapter IV, Environmental Consequences, the physical, biological, social, and economic impacts on the human environment of each alternative are disclosed. Long- and short-term effects, both direct and indirect, are considered and measures taken to mitigate them are described. Particular attention was given to the cumulative effects of both private and National Forest activities. Irreversible or irretrievable commitments of



# **1 Purpose and Need**

resources and any unavoidable, adverse environmental impacts are also noted in this chapter.

A list of preparers is included, with names and qualifications of persons primarily responsible for production of this document.

A glossary defining abbreviations, acronyms, and terms is located after the last chapter. Abbreviations are defined at first mention in the text, as well as in the glossary; most terms are defined only in the glossary, to avoid excessive interruption of the text.

A list of references cited in the DEIS is also provided. Readers will find it helpful to consult maps showing management direction proposed in each alternative.

# **Chapter 2**

## **Alternatives Including the Proposed Action**





# **Chapter 2**

## **Alternatives Including the Proposed Action**

### **Introduction**

The purpose of this chapter is to display and compare alternatives considered in detail, including the proposed action, and their environmental effects. Six alternatives for managing land and resources in the Big Islands Management Area are described, compared, and evaluated. This chapter provides: 1) a description of the process used to formulate the alternatives; 2) a description of each alternative, including the proposed action; 3) a comparison of the alternatives and their effects; 4) the identification of the proposed action; and, 5) a description of actions common to all alternatives. This chapter also discusses the reasons for eliminating other alternatives from detailed study.

The array of alternatives, considered in detail, was designed to explore a variety of ways to respond to issues, concerns and opportunities identified by the public and the Forest Service. Each alternative is a mix of site-specific proposals differing from other alternatives by the identification and location of activities. Each alternative would produce different outputs and environmental conditions. This range of alternatives provides a basis for judgement about which alternative provides the most public benefit.

### **Process Used to Formulate the Alternatives**

The formulation of the alternatives is in response to specific issues and opportunities identified through public and Forest Service participation in the scoping process and management direction in the amended Forest Plan.

The specific steps undertaken were:

1. Resource data was updated and recorded in the Geographic Information System (GIS).
2. Maps were prepared for each resource, taking into account the latest available information.
3. Comparisons were made for compatibility and potential conflict among the resources to identify areas for forest management activities. This step involved manual and computer analysis of resource information and the examination of interrelationships.
4. An array of project alternatives was developed to implement the direction of the amended Forest Plan and which is responsive to issues and opportunities.
5. Management areawide Standards and Guidelines (Appendix F) were developed to supplement Forestwide Standards and Guidelines. Together these Standards and Guidelines provide direction and mitigation for all management activities.

6. Prescriptions were developed to provide additional management direction in delineated project areas, as shown on Maps Q through V. They were designed to assure achieving a desired future condition in delineated areas where projects are proposed or where there is a specific concern or resource value that needs to be maintained.

### **Alternative Elements Considered but Eliminated from Detailed Consideration**

In addition to the six alternatives displayed in this DEIS, other approaches to implementing the amended Forest Plan were considered. They are described below, along with the reasons why they were not considered in detail.

#### **Timber Management on north Montague Island**

This proposal would have dispersed timber management over the entire island. The proposal was dropped because: (1) Harvesting an economically-efficient volume of timber from both ends of the island would have required a volume much higher than that projected by the amended Forest Plan for this decade; (2) of potential adverse effects on fisheries, recreation, visual resources and deer winter range.

#### **Timber management between Beach River and the north end of Montague Island.**

This alternative would have concentrated timber harvest along the eastern shore of Montague Island from Beach River to Zaikof Bay. It was dropped from consideration because of concerns for potential cumulative effects on wildlife habitat in the Beach River area from National Forest and private land activities.

#### **Timber management limited to the southeast side of Montague Island**

This alternative would have concentrated timber harvest activities during this entry on the southeast side of the island between Deception Creek and the Nellie Martin River. This proposal would have best met the visual quality objectives of the Forest Plan. However, this proposal was dropped because of potential cumulative effects to deer winter range from National Forest and private land activities.

#### **Proposals that would harvest less than approximately 20 mmbf**

This proposal was dropped because it would be economically inefficient to harvest less than approximately 20 mmbf of timber during this entry, given the roading and mobilization costs that would be incurred for timber harvest on Montague Island under current conditions.

#### **Proposals that harvest more than 36 mmbf of timber from Montague Island**

Timber harvest levels greater than 36 mmbf were considered to be economically efficient but were dropped from further consideration because they exceed the projected harvest levels in the amended Forest Plan.



## **Withdrawal of lands from mineral entry**

An alternative which considered the withdrawal of lands from mineral entry was not considered in detail because there are no known significant mineral resources in the management area.

## **Description of the Alternatives Including the Proposed Action**

Features Common to All Alternatives 2 - 6

To reduce the length of alternative descriptions, activities which would be performed in all alternatives are indicated below.

### **Special Uses**

One of the issues identified during scoping was a need to determine what types and level of facilities and services would be allowed under special use permits. The Standards and Guidelines for the Big Islands Management Area provide guidance when considering special use permit applications. The special uses include outfitter/guides, lodges, tent platforms, subsistence camps, electronic and communication sites, temporary facilities and camps, refueling stations, aquaculture related upland facilities, linear rights-of-way, etc.

### **Outfitter/Guide Carrying Capacity**

Applications for overnight camps by outfitter/guides are frequently submitted to the Forest. The location and number of these camps have the potential to alter the desired recreation setting as expressed in the ROS objectives. An analysis of the Big Islands Management Area determined an estimate of social carrying capacity for potential outfitter/guide sites applies to all alternatives (Appendix B). This is because all of the additional capacity occurs in areas where little or not increase in use is expected as a result of proposed projects.

The estimated additional capacity for outfitter/guides in the Big Islands is displayed in Tables 2-1 A-C. This estimated carrying capacity provides guidance to the District Ranger as to how new outfitter/guide operations would fit into the social carrying capacity of a given area. This information can also be useful in directing applicants to areas where additional capacity exists. It is assumed that this social carrying capacity information would be used when considering special permit applications. Other standards requirements include:

1. Applicable State laws and licensing requirements
2. Coordination with Alaska Department of Fish and Game
3. National Environmental Policy Act requirements
4. Recommendations from the State Prince William Sound Area Plan regarding types and locations of use
5. Determination of public need for the services
6. Standard special-use application requirements.

Tables 2-1 A-C display the existing and potential outfitter/guide capacity, potential recreation development sites, and nonoutfitter/guide sites. North Montague has no out-

## 2 Alternatives

fitter/guide operations under permit and the potential for one hunting and one fishing site. South Montague has one hunting service which operates out of the special-use lodge at MacLeod Harbor. Additional capacity includes potentially one hunting operation at Hanning Bay. Green and Hawkins islands have no outfitter/guide operations under permit and no capacity was estimated for these islands. Hinchinbrook has three hunting and two fishing sites used by outfitter/guide operations. The potential for other operations include four fishing and one hunting sites.



**Table 2-1a Outfitter/Guide Estimated Capacity**

| North Montague                  | Current O/G<br>Sites | Current Dev.<br>Rec. Sites  | Potential Dev.<br>Rec. Sites   | Potential O/G<br>Sites | Other public<br>Use "Sites" | Total<br># Sites |
|---------------------------------|----------------------|-----------------------------|--------------------------------|------------------------|-----------------------------|------------------|
| Zaikof Bay                      | 0                    | 0                           | 1 cabin site<br>*1 anchor buoy | 0                      | 4                           | 5                |
| Rocky Bay                       | 0                    | Admin. Cabin                | 1 cabin site<br>1 anchor buoy  | 0                      | 5                           | 6                |
| Stockdale                       | 0                    | 0                           | 1 cabin site                   | 1 hunting              | 3                           | 5                |
| Port Chalmers                   | 0                    | 1 rec. cabin<br>non-FS buoy | 1 anchor buoy                  | 0                      | 3                           | 4                |
| Lagoon South<br>of Pt. Chalmers | 0                    | 0                           | 1 cabin site                   | 1 fishing              | 1                           | 3                |

Coastal area between Lagoon and Manning Bay does not have a demand for O/G services. Used by kayakers for camping. No capacity established at this time.

\* = Project recommended in MAA.

# 2 Alternatives

Table 2-1b

|   | Current O/G         | Current Dev.      | Potential Dev.                    | Potential O/G       | Other public | Total   |
|---|---------------------|-------------------|-----------------------------------|---------------------|--------------|---------|
| South Montague  | Sites               | Rec. Sites        | Rec. Sites                        | Sites               | Use "Sites"  | # Sites |
| Manning Bay   | 0                   | 0                 | 1 cabin site                      | 1 hunting operation | 4            | 6       |
| MacLeod Harbor  | 1 hunting (Raymond) | Special Use Lodge | 0                                 | 0                   | 2            | 3       |
| San Juan Bay  | 0                   | 1 rec. cabin      | *1 Tent Platform                  | 0                   | 2            | 4       |
| Area between San Juan Bay and Jeanie Cove not used.   |                     |                   |                                   |                     |              |         |
| Jeanie Cove   | 0                   | 0                 | 1 cabin site                      | 0                   | 4            | 6       |
| Slump Lake  | 0                   | 2 rec. cabins     | 0                                 | 0                   | 1            | 3       |
| Nellie Martin River   | 0                   | 1 rec. cabin      | 1 cabin site<br>*2 tent platforms | 0                   | 6            | 9       |
| Beach River   | 0                   | 1 rec. cabin      | 0                                 | 0                   | 1            | 2       |
| Coastal area between Beach River and Zaikof currently has no demand for O/G services. Very little recorded use. |                     |                   |                                   |                     |              |         |
| Green Island  | 0                   | 1 rec. cabin      | 1 cabin site                      | 0                   | 5            | 7       |

\* = Project recommended in MAA

**Table 2-1c**

|  | Current O/G                              | Current Dev. | Potential Dev.                 | Potential O/G          | Other public | Total   |
|--|--|--------------|--------------------------------|------------------------|--------------|---------|
| Hinchinbrook   | Sites                                    | Rec. Sites   | Rec. Sites                     | Sites                  | Use "Sites"  | # Sites |
| NW end Island  | 0  | 1 rec. cabin | 1                              | 0                      | 4            | 6       |
| Double Bay/<br>Anderson  |  |              |                                |                        |              |         |
| Shelter Bay  | 1 hunting<br>1 fishing                   | 0            | 1 cabin site<br>1 anchor buoy  | 1 fishing              | 4            | 7       |
| Deer Cove  | 0  | 1            | 1 cabin site<br>1 anchor buoy  | 0                      | 2            | 4       |
| Constantine<br>Harbor/Port<br>Etches and<br>English Bay<br>Garden Cove | 1 fishing                                | 0            | 1 cabin site<br>3 anchor buoys | 1 hunting<br>3 fishing | 12           | 16      |
| Signal Mt.<br>Ridge to<br>Cliffs                                       | 1 hunting                                | 0            | 0                              | 0                      | 2            | 3       |
| Hook Point   | 0  | 1 rec. cabin | 0                              | 0                      | 0            | 0       |
| Boswell Bay  | Mostly State and Eyak Corporation lands. |              |                                |                        |              |         |
| Dan Bay  | 1 bear                                   | 0            | 0                              |                        | 3            | 4       |
| Hawkins Island<br>(entire<br>island)                                   | 0  | 0            | 1 cabin site                   | 0                      | 3            | 4       |

## 2 Alternatives

### **Minerals Management**

Under all alternatives, opportunities for mineral exploration and development would be permitted. Only those lands contained inside the proposed Research Natural Area (Map G) located on the southeast side of Green Island, all of Little Green Island, and the rock called the Needles (located about six miles southwest of Green Island) would be considered for withdrawal from all appropriations, including mineral entry.

Data gathered and analyzed by the Bureau of Mines and the U.S. Geological Survey (Fechner, 1988, Nelson et. al., 1988) for this planning effort indicated low potential for developable mineral resources in the MAA. The Forest Service would ensure that exploration and development of mineral resources would be carried out consistent with direction in the Forest Plan and that these activities are integrated with the planning and management of other resources on the National Forest through appropriate NEPA analysis and evaluation. The Forest Service would also require and process all operation plans, leases, permits and reclamation plans before any land-disturbing activities occur.

### **Fish and Wildlife Management**

Alaska Department of Fish and Game (ADF&G) subunits, within the larger Game Management Unit 6, are used in the description of all alternatives for wildlife resources. These subunits are the land areas by which ADF&G wildlife and population data are collected and summarized. Subunits 35, 36 and 37 (Map 2) on Montague Island encompass the entire area proposed for timber harvest activities in the management area.

Forest wildlife and fish habitat capability would remain unchanged on Hawkins, Hinchinbrook, Green, Little Green Islands, the Needles and in subunits 33, 34 and 38 on Montague Island.

In all alternatives, eagle nest trees would be protected.

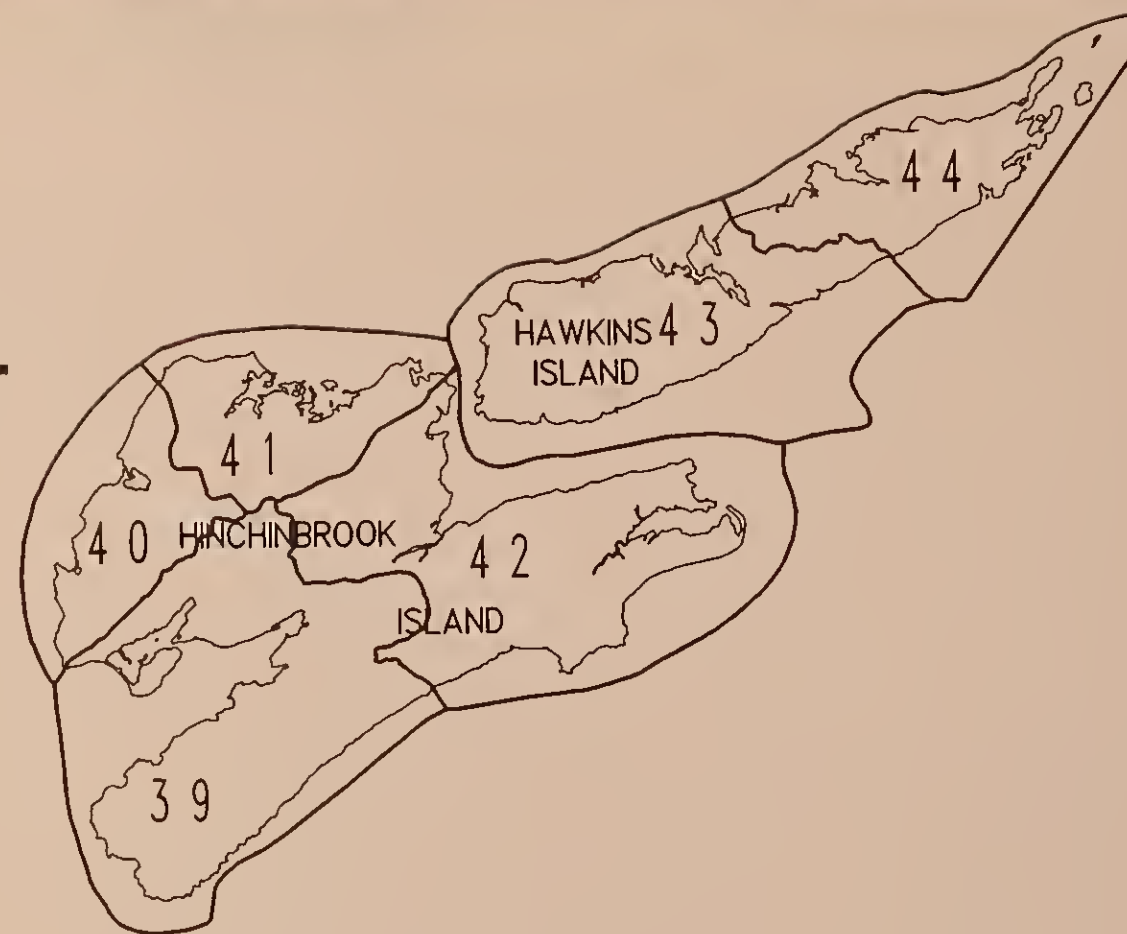
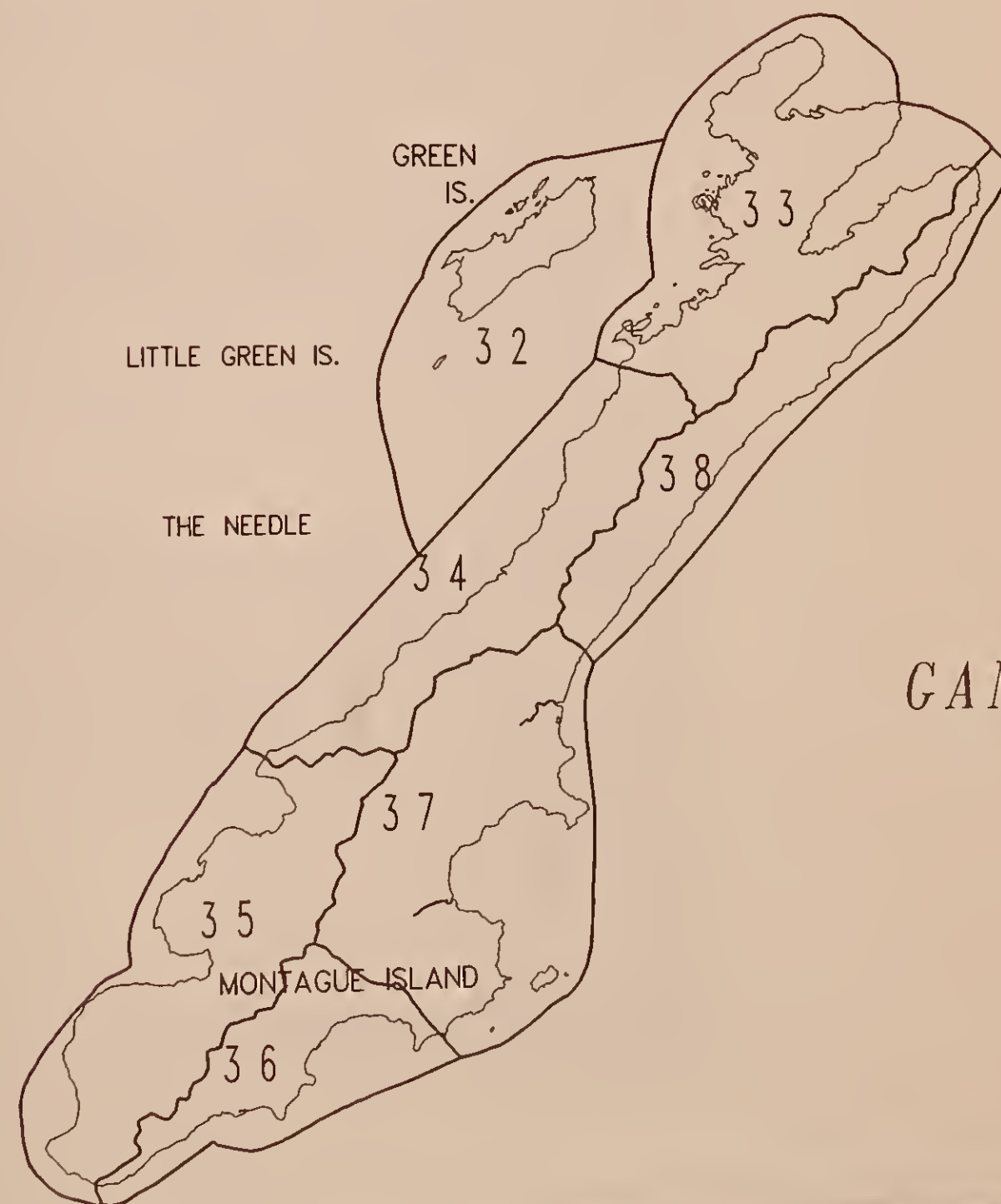
Habitat for wildlife species dependent on mature forests would be maintained in several ways. First, 885 acres on south Montague Island would be managed under prescriptive direction for wildlife habitat by not permitting timber harvest. Second, approximately 9,000 acres (5,500 acres on south Montague) would be set aside for wildlife habitat through the planning period because of unsuitability for timber harvest. In addition, 7,955 acres (commercial and unproductive forest land) of low-elevation deer winter range on Montague Island (3,844 acres on south Montague) would be managed under the Wildlife-Visual/Timber prescription (see Appendix G and Maps Q-V) which emphasizes wildlife habitat values.

Approximately 400 acres of mature forest on south Montague are braided channel fish habitats and would be classified as unsuitable for timber harvest. Additional acres of fish habitat classified as suitable for timber harvest would be maintained through application of Standards and Guidelines (Appendix F).

The feasibility of mountain goat introduction on Montague Island would be explored in cooperation with the Alaska Department of Fish and Game.



# BIG ISLANDS MANAGEMENT AREA



## GAME MANAGEMENT UNIT 6 SUBUNITS

SCALE 1 : 400,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 16, 1989

## **Timber Management**

Precommercial thinning would occur on 1,968 acres of existing second growth timber located on the west side of Montague Island (Maps J-O). Twenty percent (400 acres) would be thinned under a timber production prescription to maximize wood fiber production with the remaining eighty percent (1568 acres) to be thinned for the benefit of wildlife under a wildlife-visual/timber prescription (Appendix G). The amended Forest Plan estimated 1,800 acres of precommercial thinning over the ten year planning period. Based on current information, the amount of second growth that would be thinned would increase by 168 acres over the planning period.

Timber volume to be harvested under each action alternative would be included in one timber sale and would be offered for sale in 1993. The Ten-Year Timber Action Schedule for the amended Forest Plan specified that an estimated volume of 36 mmbf would be scheduled in one timber sale located on Montague Island in fiscal year 1992. The Interdisciplinary Team reaffirmed offering the timber as a single sale based on:

- A single sale would be more efficient and economical to prepare and administer, given the logistics of getting the harvested timber from Montague Island to the nearest point of primary manufacture.
- Given the mobilization and transportation costs involved with logging and road building on Montague Island and the fact that adjacent land owner plans to harvest timber on its lands, a sale offering larger volumes would be more likely to attract competitive bids.

Under all alternatives, tractor yarding would only be allowed under frozen ground conditions with snow cover. Exceptions would be allowed on a case-by-case basis following on-the-ground inspection.

## **Recreation Management**

In all action alternatives, recreation cabins are proposed for construction in Shelter Bay on Hinchinbrook Island (Map P) and Jeanie Cove on Montague Island. In addition, existing trails would be rehabilitated, 0.25 miles of trail constructed, and one anchor buoy installed on Montague Island (Maps J-O).

In all alternatives a public information program promoting low impact recreation techniques would be developed. In addition, all existing cabins would have food caching facilities added to them to reduce the risks of bear incidents.

A marine recreation prescription was assigned to Port Chalmers, Rocky Bay, Stockdale Harbor, and Zaikof Bay (Map V).

## **Landscape Management**

In all alternatives visual resource needs were incorporated in the location of proposed projects.

## **Research Natural Area**

As contained in the Forest Plan, a Research Natural Area would be recommended for a portion of Green Island, Little Green Island, and the Needles as shown on Map G.

## **Mitigating Measures**

Project prescriptions contained in Appendix G would be used as mitigating measures in the design and implementation of all proposed projects in all of the alternatives. Maps Q through V display the geographic location of each prescription to the management of the land and resources. The Standards and Guidelines contained within each prescription, supplement those contained in the management areawide Standards and Guidelines (Appendix F). The forestwide Standards and Guidelines would also be applied to project implementation and provide additional mitigation.

## **Monitoring**

Project level monitoring would validate implementation and effectiveness of mitigating measures and adjust those mitigation measures as necessary.

Monitoring would continue as presented in the amended Forest Plan. The management areawide Standards and Guidelines (Appendix F) contain additional monitoring measures which would be implemented to validate the assumptions associated with the amended Forest Plan. Specific monitoring activities for Management Indicator Species (MIS) are contained in Appendix C.

Road Management Objectives (RMO), consistent with resource management direction, would be developed for the entire road system. They would be reviewed annually and revised as necessary.

# **Alternatives Considered in Detail**

## **Alternative 1**

Alternative 1 is the No Action alternative. The Forest Plan would be implemented with no additional development. It provides a base for measuring the effects of all other alternatives.

Only maintenance activities would occur within the Big Islands. No Forest Service initiated activities or development of projects beyond those already under construction would occur for the life of the Forest Plan. Forestwide Standards and Guidelines would be implemented to meet the needs of a "maintenance level" of management.

Existing developments that would be maintained in this alternative are shown on Maps H and I.

Inventories to update or maintain the present knowledge of the Forest resources and their uses would continue during the planning period. Currently approved activities for all resources are described below.

## **Access**

The existing trails and public easements on Hinchinbrook and Montague Island would be maintained (Maps H, I, and P).



## 2 Alternatives

### **Fish and Wildlife**

Inventories to collect wildlife and fish habitat data, Management Indicator Species habitat use and population information would continue to provide updated information for Forest Plan revision.

Routine maintenance of two fishways and two stream channel stabilization projects would continue.

Feasibility studies would be completed on four potential fish habitat improvement sites (Table 2-2); however, none of the projects would be implemented. The ongoing experimental chum salmon reintroduction on Montague Island would continue.

Inventories designed to identify potential fisheries enhancement opportunities would continue but would be limited to four accessible sites.

### **Timber**

No timber management activities would take place.

### **Recreation**

Routine maintenance of nine cabins would continue.

Visitor use would continue at levels largely unaffected by any management activities.

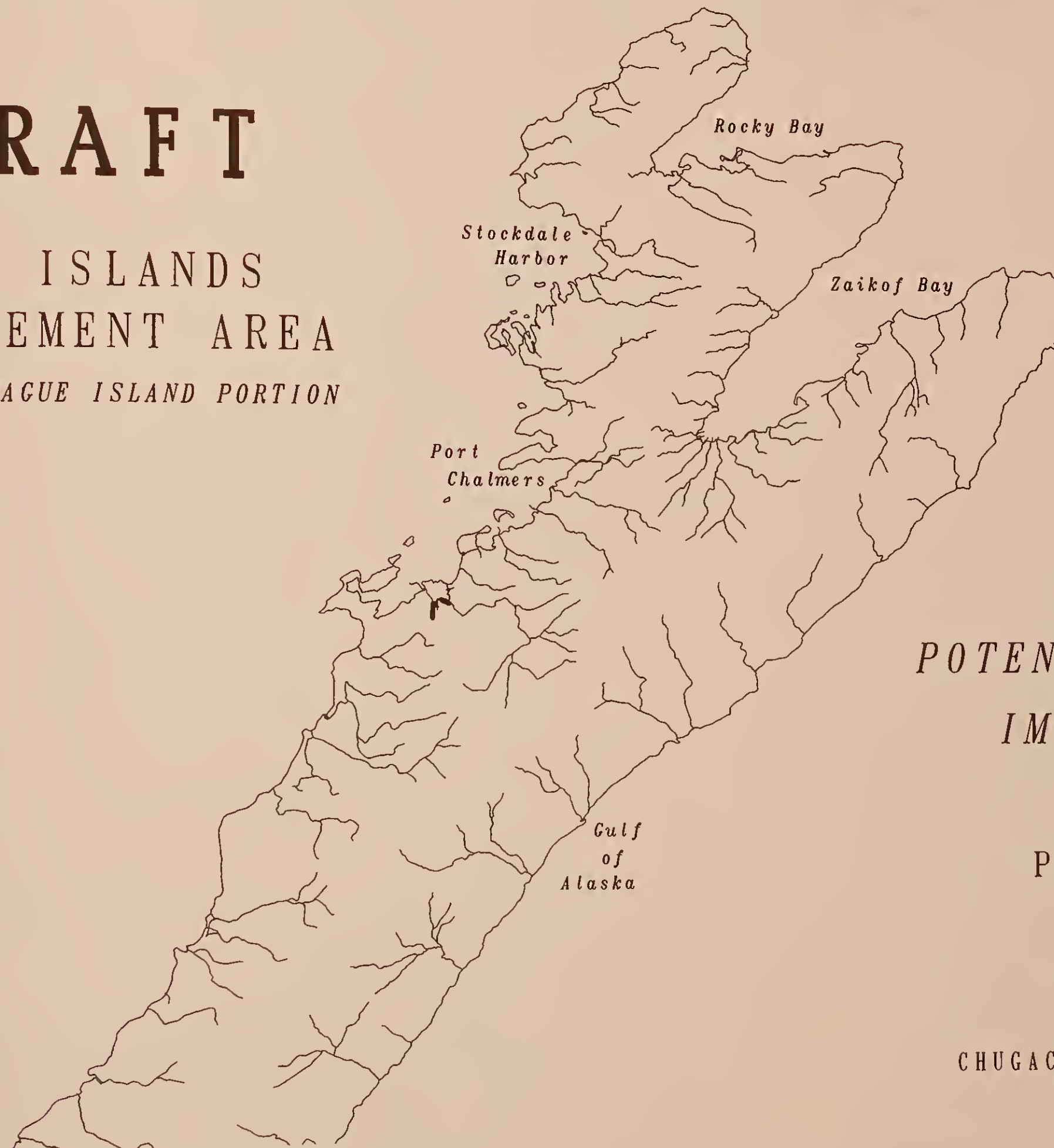
The Forest would continue to manage the management area for the recreation experiences prescribed by the Forest Plan.

Inventorying and monitoring of recreational activities would continue to provide up-to-date data to be used for the Forest Plan revision.



# DRAFT

## BIG ISLANDS MANAGEMENT AREA NORTH MONTAGUE ISLAND PORTION



POTENTIAL FISH HABITAT  
IMPROVEMENT PROJECTS

with  
Project ID Numbers

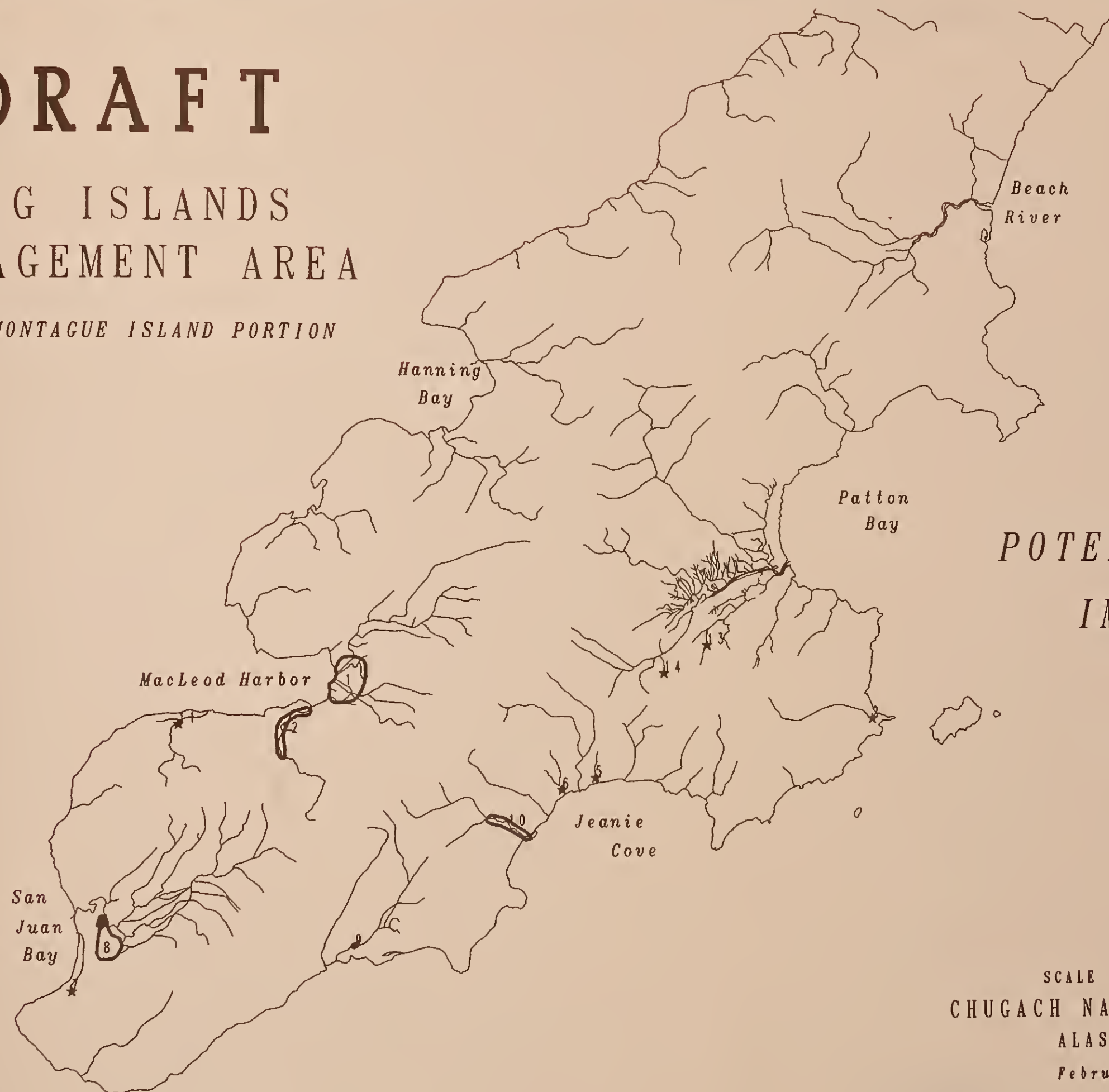
SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 15, 1989



# DRAFT

## BIG ISLANDS MANAGEMENT AREA

*SOUTH MONTAGUE ISLAND PORTION*



*POTENTIAL FISH HABITAT  
IMPROVEMENT PROJECTS*

with  
Project ID Numbers

SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 15, 1989

DRAFT

U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

WATER RESOURCES DIVISION

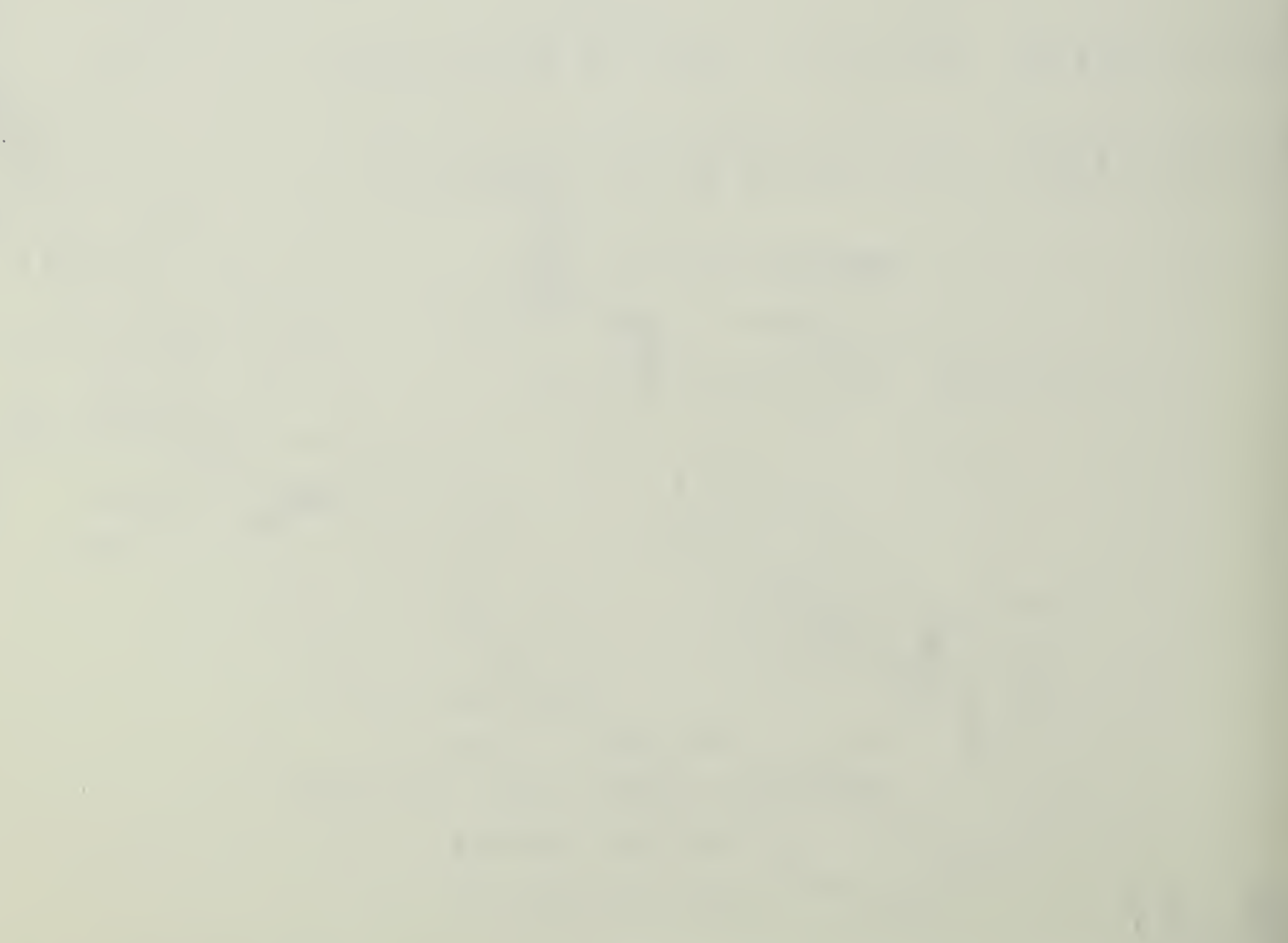




Table 2-2

## Potential Fish Habitat Improvement projects

### Feasibility Studies

| Area                   | Type of Project              | Estimated Output in lb per yr. | Alternative |
|------------------------|------------------------------|--------------------------------|-------------|
| 1 Macleod Harbor       | Spawning Channel             | 69,950 pink/chum               | All         |
| 2 Stump Lake outlet    | Lake Stabilization           | N/A                            | All         |
|                        |                              | Coho/sockeye                   |             |
|                        |                              | Dolly Varden                   |             |
|                        |                              | Cutthroat                      |             |
| 3 Chalmers River       | Spawning Channel             | 14,570 Chum                    | All         |
| 4 Chalmers River       | Spawning Habitat             | 34,970                         | All         |
|                        | Channel Overflow Improvement | Pink/Chum                      |             |
| 5 Jeanie Cove Stream   | Barrier Removal              | 550                            |             |
| Number 17836           |                              | Coho/Cutthroat                 | 4,5,6       |
| 6 Jeanie Cove Stream   | Barrier Removal              | 1,100                          | 4,5,6       |
| Number 17838           | Coho/Cutthroat               |                                |             |
| 7 San Juan Bay Stream  | Steeppass                    | 410                            | 2-6         |
| Number 16990           | Coho                         |                                |             |
| 8 San Juan Bay Stream  | Rearing Ponds                | 13,700                         | 2-6         |
| Number 17000           | Coho                         |                                |             |
| 9 Strike Creek         | Rearing Habitat              | 6,850                          | 4,5,6       |
|                        |                              | Coho                           |             |
| 10 Slide Creek         | Channel Stabilization        | 9,970                          | 4,5,6       |
|                        | Rearing Habitat              | Coho                           |             |
| 11 McCleod Harbor      | Fish Passage                 | 33,130                         | 4,5,6       |
| Number 17010           | Pink/Coho                    |                                |             |
| 12 McLeod Harbor       | Channel Stabilization        | 13,220                         | 2-6         |
| Number 17020           | spawning/rearing Hab         | Pink/Coho                      |             |
| 13 Upper Nellie Martin | Fish Passage                 | 1,230                          | 2-6         |
| Number 17790           | Coho                         |                                |             |
| 14 Upper Nellie Martin | Barrier Removal              | 820                            | 4,5,6       |
| Number 17790           | Coho                         |                                |             |

## Alternative 2

During the planning period, Alternative 2 (Maps J, O, Q, & V) concentrates most resource development within the management area between MacLeod Harbor and San Juan Bay on Montague Island. This alternative was developed to:

1. separate Forest Service management from private land management and minimize the cumulative effects of timber management in the Nellie Martin River area;
  2. maintain and enhance high-value fish and wildlife habitat capability;
  3. supply timber to local industry consistent with other resource objectives;
  4. maintain the present recreational experience by little if any investment in new recreation developments and concentrating additional investments in the rehabilitation of existing facilities;
  5. Forest management activities proposed in this alternative would be below those levels identified in the approved Forest Plan. The emphasis is to focus all vegetative management activities away from riparian timber harvests of private lands located at Patton Bay and Reach River. Under this alternative, a mix of projects (Tables 2-9 & 2-10) would be approved for implementation.
- Access**
- The transportation system (Maps J & O), which would only serve Chugach National Forest resources, would be constructed with an emphasis on the southwest part of Montague Island between MacLeod Harbor and San Juan Bay to accommodate resource development and public use. It would consist of:
- \* 38.6 miles of roads
  - \* 0.25 miles of nonmotorized trails
  - \* 2 airstrip feasibility studies
  - \* 1 anchor buoy
  - \* 1 log transfer facility
- The road system in the MacLeod Harbor and San Juan Bay areas would consist of 11.6 miles of arterial, 1.9 miles of collector, 16.8 miles of local, and 8.3 miles of temporary roads.
- The log transfer facility would be located on the south shore of MacLeod Harbor. Airstrip feasibility studies would be conducted at MacLeod Harbor and Nellie Martin River areas.
- A nonmotorized trail would be constructed at Stump Lake.
- One anchor buoy would be installed in Zaikof Bay.



## **Fish and Wildlife**

Habitat capability on the southeast side of Montague Island (subunits 36 and 37 -- Map 2) would not be changed. Important south aspect deer winter range habitat (Map C) in the San Juan drainage would be maintained.

South aspects of suitable forest land on the southeast side of Montague Island and in the San Juan drainage would be managed with a wildlife emphasis (Map Q).

Wildlife and fish habitat would be maintained in San Juan River and Nellie Martin River priority #1 stream habitat zones (Map B). The habitat would be maintained by avoiding any ground disturbing activities in these areas.

Feasibility studies would be completed for eight potential fish habitat improvement sites (Table 2-2 and Map J). An estimated 201,400 pounds of fish would be produced annually if all projects were found feasible and were implemented.

## **Timber**

Approximately 20.9 MMBF of mature to over-mature sawtimber on 777 acres of suitable forest land (Maps E-F) would be harvested using the clearcut regeneration system (Map J). This represents 3.6 percent of the mature to over-mature commercial stands on the National Forest portion of Montague Island or 1.2 percent of mature to over-mature productive forest land (PFL) in the management area that would be harvested during the planning period.

Ninety-seven percent of the harvest acreage would be harvested by conventional cable systems. The remaining three percent would be harvested by tractor. Harvest unit size ranges from 6 to 58 acres with an average size of 24 acres.

## **Mitigation Measures**

For each harvest unit (Maps 31-35) in the proposed initial timber sale entry, site specific resource concerns that could be identified from aerial photos or on-the-ground knowledge of the area have been identified and are listed by alternative. For each site specific concern, mitigation measures that are to be applied in that harvest unit are specified.

Mitigation measures are specific measures that will be required in each harvest unit (Tables 2-3 through 2-8). They are based on each specialist's review of the aerial photos showing intended unit locations and on their knowledge of the area. Some minor changes in unit location are unavoidable due to undetectable ground conditions that will affect road, setting, and unit boundary locations. Field layout of each unit will involve consultation with the specialist for any resource with an entry for that unit in the tables. All specialists will review each unit before finalizing the sale layout to assure no significant change in impacts has occurred during field layout.

## **Precommercial Thinning Stands**

For each stand to be precommercially thinned (Maps 29 and 30) during this planning period, site specific resource concerns that could be identified from aerial photos or on-the-ground knowledge of the area have been identified and are listed by alternative.

## 2 Alternatives

For each site specific concern, mitigation measures that are to be applied in the stand are specified.

Mitigation measures are specific measures that will be required in each stand to be precommercially thinned (PCT). They are based on each specialist's review of the aerial photos showing intended PCT locations and on their knowledge of the area. Some minor changes in PCT location are unavoidable due to undetectable ground conditions. Field layout of each unit will involve consultation with the specialist for any resource with an entry for that unit in the tables. All specialists will review each PCT unit before finalizing the PCT layout to assure no significant change in impacts has occurred during field layout.



The following is a key for interpretation of the tables:

**UNIT NO:** Harvest unit identification number for alternative.

**STAND ID:** Stand identification number for precommercial thinning areas.

**RX:** Management Prescription number of harvest unit

15 = Riparian Prescription

17 = Wildlife-Visual/Timber Prescription

18 = Timber/Wildlife-Visual Prescription

19 = Timber Production Prescription

**ACRES:** the acreage of the harvest unit or stand to be thinned.

**LS:** Logging System that will be used to harvest the unit.

TR = Tractor system such as rubber tired skidder or shovel yarder

HL = Highlead cable system

**YD:** Direction logs will be yarded in the unit relative to the slope.

LE = logs will be yarded on level ground to landing

UH = logs will be yarded uphill to landing

DH = logs will be yarded downhill to landing

## **CODES FOR RESOURCE CONCERNS AND MITIGATION MEASURES BY RESOURCE**

### **CULTURAL**

EHS = Existing Historic site within the harvest unit. Archeological survey will be done prior to or during layout to locate, mark, and document any existing sites. Sites will be avoided during sale operations. See Cultural Resource Standards & Guidelines.

UNSRUVD = Cultural resources are unsurveyed.

CS&G = Apply cultural resource Standards and Guidelines to mitigate any cultural resource concerns.

### **LANDS:**

PVT BND = Forest Service Land is adjacent to Private Land.

SURVEY LL = Survey and identify land line location prior to unit layout.

### **SOILS AND WATER:**

PS = Partial suspension will be required during yarding. Specific area will be determined during unit layout by a soil scientist and will be designated in the timber sale contract.

FS = Full suspension will be required during yarding. Specific area will be determined during unit layout by a soil scientist and will be designated in the timber sale contract.

## 2 Alternatives

YR = Tractor yarding is restricted to periods of the year when snow cover is present.

WT = Possible windthrow problem to be considered. Locate unit boundary to minimize windthrow risk.

AR = Artificial Regeneration recommended.

TOG = Thin organic surface layer

SE = Soil Erosion

MM = Mass Movement

VN = V-notch

Str.B = Stream Bank

FP = Flood Plain

SS = Sideslope

P = Protect

PS = Protect Soil

Pstr.B = Protect Stream Bank

FS = Full Suspension

SSP = Sideslope Protection

PFP = Protect Flood Plain

PVN = Protect V-notch

Protection measures will be designated for specific stream sections. Measures may include one or more of the following: directional falling, leaving unmerchantable trees, using stream for splitline, requiring full or partial suspension during yarding, or varying degrees of stream cleanout.

### **FISHERIES**

CT1 = Streams will be inventoried, channel types will be classified and Aquatic Habitat Management Units (AHMU) will be delineated prior to field layout of harvest unit. Stream channel types are defined in the Channel Types Field Guide (R-10-M-6). Delineation of AHMU are described in the MAA wide Standards and Guidelines. Includes units with Class I and II streams.

CT2 = Streams will be inventoried, channel types will be classified and Aquatic Habitat Management Units (AHMU) will be delineated during field layout of harvest unit. Stream channel types are defined in the Channel Types Field Guide (R-10-M-6). Delineation of AHMU are described in the MAA wide Standards and Guidelines. Includes units with no identified streams or only Class III streams.

Class I = Streams within or near unit contain anadromous fish habitat or high value resident sport fisheries. This also includes the habitat upstream from migration barriers

if there is a reasonable opportunity to provide fish passage in the future. See mitigation measures common to all AHMUs and measures specific to Class I AHMUs below.

Class II = Streams within or near unit contain resident fish populations which have limited sport fisheries values. These generally occur upstream of anadromous migration barriers or are steep gradient streams which preclude anadromous fish use. See mitigation measures common to all AHMUs and measures specific to Class II AHMUs on the following pages.

Class III = Streams within or near unit do not contain significant populations of resident fish, but may have potential water quality influences on downstream fish habitat. See mitigation measures common to all AHMUs and measures specific to Class III AHMUs on the following pages.

H = Unit has a moderate/high potential for adverse impacts on fish habitat. Unit will require field review to determine if additional protection measures may be required.

## **Fisheries Mitigation Measures**

A. The following apply to all Class I, Class II, and Class III AHMUs.

1. Use stream split lines whenever possible (i.e. logs should be yarded away from the stream in both directions rather than across the channel).
2. Felled or windfallen trees designated for removal from streamcourses will not be limbed until clear of the streamcourse.
3. Leave standing all trees which affect streambank stability, including all deciduous and unmerchantable vegetation.
4. Leave all existing (natural) instream debris.
5. Revegetate areas of exposed mineral soil during the first growing season following exposure.
6. Minimize the introduction of sediment when clearing road corridor and during construction and operation activities. Leave as much undisturbed ground cover as possible between the road and the stream. Complete endhaul of waste material will be required when there is the probability of downhill movement of the material into the stream below.
7. Minimize the use of heavy equipment in streams.
8. Require bridge brow logs for log stringer bridges to contain bridge surfacing materials and prevent entry of sediment into the stream.

B. The following apply specifically to Class I AHMUs.

1. Directionally fall timber away from streamcourses (to include lining and jacking as necessary).
2. Fully suspend any trees or products yarded across streamcourses.
3. Leave any trees that cannot be directionally felled away from the streamcourse.



## 2 Alternatives

4. Leave all windthrow in or suspended over the stream channel unless doing so would adversely affect stream channel stability. Allow salvage only if AHMU objectives are met.
5. Leave all trees inadvertently felled into or across streams in place unless doing so would adversely affect stream channel stability or water quality.
6. Leave as many of the following trees as possible within 75 feet of the stream: deciduous trees; coniferous trees less than 12 inches DBH; snags; and trees with a 10% or greater lean toward the stream.
7. Designate additional leave trees as necessary to provide for future sources of large woody debris (LWD).
8. Remove all small, unattached debris introduced into the streamcourse by human activity within 48 hours of its introduction.
9. During precommercial thinning activities: 1. manage alder immediately adjacent to the stream to provide 75% shade on the stream; and remove the complete canopy only along stream sections with abundant instream cover.
10. Minimize the use of heavy equipment in streams. Where necessary, the timing of these activities will be restricted to avoid adverse impacts to salmonoid eggs and pre-emergent fry.
11. Provide fish passage for all species on all streams with gradients of less than 4 percent.
12. For streams with gradients greater than 4 percent, evaluate the potential tradeoff between the loss of rearing fish production and the cost of providing passage for juvenile fish. Consult the Aquatic Habitat Management Handbook, FSH 2609.24 for the method of making trade-off comparisons.
13. The following criteria will provide additional direction for timber harvest activities within Aquatic Habitat Management Units, depending on the channel type of the stream. Distances shown are windfirm distances from the streambank; greater distance may be required to achieve reasonable assurance that windthrow will not occur within the windfirm distance as a result of adjacent harvest activity.
  - a. Low Gradient Floodplains (Channel types B1, B8, C1, C3, C4, D4, D5): No harvest within 0 to 60 feet of streambanks for B1 or B8 channel types not associated with other channel types; Allow single tree selection harvest only within 60 to 20 feet on the above channels; and No harvest within 0 to 200 feet of streambanks on C1, C3, C4, D4 and D5 channels.
  - b. Estuary Channels (Channel types E1, E2, E3, E5): No harvest within 500 feet of E1 and E5 channels; and no harvest within 200 feet of E2 and E3 channels.
  - c. Alluvial Fans (Channel Types A3, B5, D1, D6): No harvest within active portion of fan or 60 feet of streambank, whichever is greater.



d. Low Gradient Nonforested Channels and Moderate Gradient Footslope Channels: Allow single tree selection only within AHMU.

e. Lakes and Ponds (Channel types L, L3, L4, L5): Allow unevenage management within 200 feet.

f. Moderate Gradient Incised Channels (Channel types B4, B6): Selectively leave trees with crowns that do not extend above slope break; Maintain near natural snag component of stand; and No harvest within 25 feet of streambank.

g. Large Low Gradient Incised Channels (Channel types C2, C5): No harvest within the inner gorge.

h. Placid or Glide Channels (Channel types L1, L2): No harvest except for incidental tree selection (eg., bridge stringers).

C. The following apply specifically to all Class II AHMUs.

1. Directionally fall timber away from streamcourses, to the extent practicable. Trees which cannot be felled away from the stream will be felled to bridge the stream.

2. Partially suspend any trees or products yarded across streamcourses.

3. Yard timber influencing a streamcourse the same season as felled.

4. Remove all small, unattached debris introduced into the streamcourse by human activity within 48 hours of its introduction.

5. Leave all windthrow in or suspended over the stream channel unless doing so would adversely affect stream channel stability. Allow salvage only if AHMU objectives are met.

6. Leave as many of the following trees as possible within 75 feet of the stream: deciduous trees; coniferous trees less than 12 inches DBH; snags; and trees with a 10% or greater lean toward the stream.

7. Provide fish passage for all species on all streams with gradients of less than 4 percent.

8. For streams with gradients greater than 4 percent, evaluate the potential tradeoff between the loss of rearing fish production and the cost of providing passage for juvenile fish. Consult the Aquatic Habitat Management Handbook, FSH 2609.24 for the method of making trade-off comparisons.

9. The following criteria will provide additional direction for timber harvest activities within Aquatic Habitat Management Units depending on the channel type of the stream. Distances shown are windfirm distances from the streambank; greater distance may be required to achieve reasonable assurance that windthrow will not occur within the windfirm distance as a result of adjacent harvest activity.

- a. Alluvial Fans (Channel Types A3, B5, D1, D6): No harvest within active portion of fan or within 25 feet of streambank, whichever is greater; Allow single tree selection only within 25 to 60 feet from streambank if not within active portion of fan.

## 2 Alternatives

- b. Low Gradient Nonforested Channels and Moderate Gradient Footslope Channels (Channel types B2, B3): Allow single tree selection only within 25 windfirm feet of B2 channels; and Allow single tree selection only within 60 windfirm feet of B3 channels.
  - c. Lakes and Ponds (Channel types L, L3, L4, L5): Allow unevenage management within 100 feet of lakes less than 50 acres in size; and Allow unevenaged management within 200 feet of lakes greater than 50 acres in size.
  - d. Moderate Gradient Incised Channels (channel types B4, B6): Allow harvest to the streambank.
  - e. Large Low Gradient Incised Channels (Channel types C2, C5): No harvest within 25 feet of streambank; and Full suspension required to cross stream channel.
  - f. Placid or Glide Channels (Channel types L1, L2): No harvest within AHMU except for incidental tree selection (eg., bridge stringers).
- D. The following apply specifically to all Class III AHMUs.
- 1. Directionally fall timber away from streamcourses, to the extent practicable.
  - 2. Partially suspend any trees or products yarded across streamcourses.
  - 3. Avoid yarding up or down streamcourse.
  - 4. No ground lead yarding downhill within V-notches.
  - 5. yard timber influencing a streamcourse the same season as felled.
  - 6. Remove all rootwads and all large accumulations of limbs, tops, and other introduced debris which may have the potential to impede or divert the natural streamflow concurrent with yarding.
  - 7. Design crossing of V-notched drainages to prevent debris jamming.
  - 8. Culvert gradient should follow natural gradient for non-fish streams where needed to prevent downstream erosion.
  - 9. The following criteria will provide additional direction for timber harvest activities within Aquatic Habitat Management Units, depending on the channel type of the stream. Distances shown are windfirm distances from the streambank; greater distance may be required to achieve reasonable assurance that windthrow will not occur within the windfirm distance as a result of adjacent harvest activity.
    - a. High Gradient and Moderate Gradient Incised Channels (Channel types A1, A2, A4, A5, A6, A7, B4, B6, B7, D2, D7): Allow harvest to the streambank; and Full suspension required to cross stream channel.
    - b. Alluvial Fans (Channel Types A3, B5, D1, D6): No harvest within active portion of fan or within 25 feet of streambank, whichever is greater.
    - c. Low Gradient Nonforested Channels and Moderate Gradient Footslope Channels (Channel types B2, B3): Allow only single tree selection within 25 windfirm feet of B2 channels.



## **WILDLIFE**

**Eagle:** The 330' windfirm buffer will be established around known eagle nests. Trees suitable for use by nesting and roosting eagles will be maintained in remainder of unit. Selection criteria for leave trees include: trees that dominate or codominate a shoreline; trees with large enough branches to support eagles; trees with open crowns; and narrow fringe of trees along shoreline. **Eret:** Nesting and roosting trees suitable for use by eagles will be retained. Selection criteria for leave trees include: trees that dominate or codominate a shoreline; trees with large enough branches to support eagles; trees with open crowns; and narrow fringe of trees along shoreline.

**Goose:** Portions of the unit within 330 feet of goose habitat will not be harvested when geese are present during nesting, broodrearing, molting or wintering periods.

**Wildthin:** Precommercial thinning will emphasize wildlife habitat needs. Thinning will be accomplished to include an average tree spacing of 16-20 feet, small unthinned clumps (one-half acre or less) of healthy trees will be maintained; corridors of approximately 50 feet in width will be designated and slash will be lopped and scattered to lie within 2 feet of the ground; openings of one-half acre will be designated in approximately 10% of the stand; and slash will be lopped and scattered to lie within 2 feet of the ground.

## **VISUALS**

### **ADOPTED VISUAL QUALITY OBJECTIVE**

R = Retention

PR = Partial Retention

M = Modification

MM = Maximum Modification

OK = Unit meets visual quality objective (VQO) set for area.

Modify = Unit as is does not meet adopted VQO for area and would require some modification during layout to meet the VQO. The degree to which the unit does not meet the VQO is acceptable for this entry.

Adjust = Unit as planned meets adopted VQO but the landscape architect would like to make some minor changes to reduce visual impact. These changes generally involve making irregular boundaries in visible portions of the unit. Layout forester and landscape architect will consider changes during field layout.

100'SDZ = 100 foot slash disposal zone in unit.

100'SRZ = 100 foot stump reduction zone in unit.

100'NTZ = 100 foot no precommercial thinning zone (extends from road or beach into unit 100 feet).

Table 2-3a: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 2

| UNIT | RX | ACRES | LS | YD | CULTURAL | LANDS     | SOILS                | WATER      | FISHERIES      | WILDLIFE    | VISUALS |
|------|----|-------|----|----|----------|-----------|----------------------|------------|----------------|-------------|---------|
|      |    |       |    |    | UNSURVD  | PVT BND   | TOG <10% OG re-moval | StrB & FP  |                |             |         |
| 1    | 17 | 13    | TR | LE | CS&G     | SURVEY LL | YR                   | PStrB & FP | CT1, CLASS I   | ERET        | OK      |
| 2    | 17 | 13    | TR | LE | "        |           | TOG <10% OG re-moval | "          | CT1, CLASS I   | ERET        | OK      |
| 3    | 19 | 32    | HL | UH | "        |           | SE                   | SE         | CT2, CLASS III |             | PR      |
| 4    | 18 | 24    | HL | DH | "        |           | MM & SE, VN          | SE         | CT2, CLASS III |             | PR      |
| 5    | 18 | 38    | HL | DH | "        |           | FS over VN, PS       | SSP        | CT2, CLASS III | ERET        | OK      |
| 6    | 19 | 29    | HL | DH | "        |           | SE                   | SE         | CT2, CLASS III |             | PR      |
| 7    | 18 | 12    | HL | UH | "        |           | MM & SE              | SSP        | CT1, CLASS I   | ERET        | OK      |
| 8    | 19 | 20    | HL | DH | "        |           | FS over VN, PS       | "          | CT2, CLASS III |             | PR, M   |
| 9    | 19 | 49    | HL | DH | "        |           | MM & SE              | SE         | CT2, CLASS III |             | PR, M   |
| 10   | 19 | 38    | HL | DH | "        |           | FS over VN, PS       | SSP        | CT2, CLASS III |             | OK      |
| 11   | 18 | 7     | HL | DH | "        |           | MM & SE              | "          | CT2, CLASS III |             | PR, M   |
| 12   | 18 | 11    | HL | UH | "        |           | FS over VN, PS       | "          | CT2, CLASS III |             | OK      |
| 13   | 19 | 16    | HL | DH | "        |           | MM & SE              | "          | CT2, CLASS III |             | PR      |
| 14   | 18 | 19    | HL | DH | "        |           | PS & AR              | "          | CT1, CLASS I   | ERET, GOOSE | MODIFY  |
| 15   | 18 | 15    | HL | DH | "        |           | MM & WT, cliff       | "          | CT2, CLASS III | EAGLE       | MODIFY  |
| 16   | 18 | 16    | HL | DH | "        |           | PS & AR              | "          | CT2, CLASS III |             | PR      |
| 17   | 18 | 24    | HL | UH | "        |           | PS                   | "          | CT2, CLASS III |             | OK      |
| 18   | 18 | 31    | HL | UH | "        |           | PS                   | Str.B      | CT2, CLASS III |             | PR      |
| 19   | 19 | 14    | HL | DH | "        |           | MM & WT, cliff       | "          | CT2, CLASS III |             | MODIFY  |
| 20   | 18 | 15    | HL | DH | "        |           | PS & AR              | SSP        | CT2, CLASS III |             | PR, M   |
|      |    |       |    |    |          |           |                      |            |                |             | OK      |
|      |    |       |    |    |          |           |                      |            |                |             | PR      |
|      |    |       |    |    |          |           |                      |            |                |             | OK      |



Table 2-3b: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 2

| UNIT | RX | ACRES | LS | YD | CULTURAL | LANDS          | SOILS      | WATER           | FISHERIES      | WILDLIFE | VISUALS |
|------|----|-------|----|----|----------|----------------|------------|-----------------|----------------|----------|---------|
| 21   | 19 | 14    | HL | UH | CS&C     | UNSURVD        | PS         | SSP             | CT1, CLASS I   | GOOSE    | M       |
| 22   | 19 | 11    | HL | DH | "        | TOG OF FP      | PS         | SE & Str.B      | CT2, CLASS III |          | M       |
| 23   | 19 | 6     | HL | DH | "        | SE             | SE         | Str.B           | CT2, CLASS III |          | M       |
| 24   | 19 | 30    | HL | DH | "        | PVN,PS         | PS         | PS over Str.    | CT2, CLASS III |          | OK      |
| 25   | 18 | 21    | HL | UH | "        | PS             | PS         | SSP             | CT1, CLASS I   |          | PR      |
| 26   | 18 | 48    | HL | DH | "        | MM & SE        | MM & SE    | SE              | CT1, CLASS I   |          | PR      |
| 27   | 18 | 21    | HL | UH | "        | MM upper slope | PS         | SSP             | CT1, CLASS I   |          | PR,M    |
| 28   | 18 | 27    | HL | DH | "        | PS & PVN       | PS & PVN   | "               | CT2, CLASS III |          | PR      |
| 29   | 18 | 48    | HL | DH | "        | Active MM      | Active MM  | SE              | CT1, CLASS I   |          | PR      |
| 30   | 18 | 12    | HL | DH | "        | MM & SE        | MM & SE    | SE              | CT2, CLASS III |          | PR,M    |
| 31   | 18 | 22    | HL | DH | "        | PS             | PS         | SSP             | CT2, CLASS III |          | OK      |
| 32   | 18 | 22    | HL | UH | "        | PS             | PS         | Str.B           | CT1, CLASS I   |          | R       |
| 33   | 18 | 58    | HL | DH | "        | MM & SE        | MM & SE    | SE & Str.B      | CT2, CLASS III |          | MODIFY  |
|      |    |       |    |    |          | FS over VN     | FS over VN | SSP,FS over Str | CT2, CLASS III |          | PR      |
|      |    |       |    |    |          |                |            |                 |                |          | MODIFY  |
|      |    |       |    |    |          |                |            |                 |                |          | R,PR    |
|      |    |       |    |    |          |                |            |                 |                |          | MODIFY  |

Table 2-4a: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 3

| UNIT | RX | ACRES | LS | YD | CULTURAL | LANDS                | SOILS                         | WATER                        | FISHERIES      | WILDLIFE    | VISUALS      |
|------|----|-------|----|----|----------|----------------------|-------------------------------|------------------------------|----------------|-------------|--------------|
| 1    | 17 | 13    | TR | LE | CS&G     | PVT BND<br>SURVEY LL | TOG <10% OG re-<br>moval YR   | Str. B & SE<br>P Str. B & FP | CT1, CLASS I   | ERET        | M<br>OK      |
| 2    | 17 | 13    | TR | LE | "        | "                    | TOG <10% OG re-<br>moval YR   | "                            | CT1, CLASS I   | ERET        | M<br>OK      |
| 3    | 19 | 32    | HL | UH | "        | "                    | SE<br>PS                      | SE<br>SSP                    | CT2, CLASS III |             | PR<br>MODIFY |
| 4    | 18 | 24    | HL | DH | "        | "                    | MM & SE, VN<br>FS over VN, PS | "                            | CT2, CLASS III |             | PR<br>OK     |
| 5    | 18 | 38    | HL | DH | "        | "                    | "                             | SSP                          | CT2, CLASS III | ERET        | R, PR<br>OK  |
| 6    | 19 | 29    | HL | DH | "        | "                    | "                             | SE<br>SSP                    | CT2, CLASS III |             | PR<br>OK     |
| 7    | 18 | 12    | HL | UH | "        | "                    | PS                            | SSP & PStr.                  | CT1, CLASS I   | ERET        | R, PR<br>OK  |
| 8    | 19 | 20    | HL | DH | "        | "                    | FS over VN, PS                | SE<br>SSP                    | CT2, CLASS III |             | PR, M<br>OK  |
| 9    | 19 | 49    | HL | DH | "        | "                    | MM, SE<br>FS over VN, PS      | "                            | CT2, CLASS III |             | PR, M<br>OK  |
| 10   | 19 | 38    | HL | DH | "        | "                    | "                             | "                            | CT2, CLASS III |             | PR, M<br>OK  |
| 11   | 18 | 19    | HL | DH | "        | "                    | MM & WT, cliff<br>PS & AR     | SSP                          | CT1, CLASS I   | ERET, GOOSE | R<br>MODIFY  |
| 12   | 18 | 15    | HL | DH | "        | "                    | "                             | "                            | CT2, CLASS III | EAGLE       | R<br>MODIFY  |
| 13   | 18 | 16    | HL | DH | "        | "                    | PS                            | "                            | CT2, CLASS III |             | PR<br>OK     |
| 14   | 18 | 24    | HL | UH | "        | "                    | "                             | "                            | CT2, CLASS III | ERET        | PR<br>OK     |
| 15   | 18 | 31    | HL | UH | "        | "                    | "                             | Str. B<br>FS over Str.       | CT2, CLASS III |             | PR<br>MODIFY |
| 16   | 19 | 14    | HL | DH | "        | "                    | MM & WT, cliff<br>PS & AR     | SSP                          | CT2, CLASS III | ERET        | PR, M<br>OK  |
| 17   | 18 | 15    | HL | DH | "        | "                    | "                             | "                            | CT2, CLASS III | ERET        | PR<br>OK     |
| 18   | 19 | 14    | HL | UH | "        | "                    | PS                            | "                            | CT1, CLASS I   | GOOSE       | M<br>OK      |
| 19   | 19 | 11    | HL | DH | "        | "                    | TOG on FP<br><10% OG removal  | SE & Str. B<br>FS over Str.  | CT2, CLASS III |             | M<br>OK      |
| 20   | 19 | 6     | HL | DH | "        | "                    | "                             | "                            | CT2, CLASS III |             | M<br>OK      |

Table 2-4b: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 3

| UNIT | RX | ACRES | LS | YD | CULTURAL | LANDS   | SOILS                   | WATER        | FISHERIES      | WILDLIFE    | VISUALS |
|------|----|-------|----|----|----------|---------|-------------------------|--------------|----------------|-------------|---------|
| 21   | 19 | 30    | HL | DH | CS&G     | UNSURVD | SE                      | Str.B        |                |             | M       |
|      |    |       |    |    |          |         | PS,PVN                  | FS over Str. | CT2, CLASS III |             | OK      |
| 22   | 18 | 20    | HL | UH | "        |         | MM,SE                   | SE           |                |             | PR      |
|      |    |       |    |    |          |         | FS over VN,PS           | SSP          | CT2, CLASS III | ERET        | OK      |
| 23   | 18 | 25    | HL | DH | "        |         | MM, SE                  |              |                |             | PR      |
|      |    |       |    |    |          |         | PS                      | "            | CT2, CLASS III |             | MODIFY  |
| 24   | 18 | 36    | HL | UH | "        |         | SE                      | SE, Str.B    | H              |             | R,PR    |
|      |    |       |    |    |          |         | PVN,PS                  | P Str.B      | CT1, CLASS I   | ERET        | MODIFY  |
| 25   | 18 | 49    | HL | DH | "        |         | MM, SE                  | SE           |                |             | PR      |
|      |    |       |    |    |          |         | FS over VN,PS           | FS over Str. | CT1, CLASS II  |             | MODIFY  |
| 26   | 18 | 25    | HL | DH | "        |         | "                       | SE           |                |             | PR      |
|      |    |       |    |    |          |         |                         | SSP          | CT2, CLASS III | ERET        | OK      |
| 27   | 15 | 60    | TR | LE | "        |         | TOG <10% OG re-moval YR | Str.         | H              |             | M       |
|      |    |       |    |    |          |         | TOG <10% OG re-moval YR | FS, PStr.    | CT1, CLASS I   | ERET, GOOSE | OK      |
| 28   | 15 | 18    | TR | LE | "        |         | TOG <10% OG re-moval YR | "            | H              |             | M       |
|      |    |       |    |    |          |         | TOG <10% OG re-moval YR |              | CT1, CLASS I   |             | OK      |
| 29   | 15 | 21    | TR | LE | "        |         | TOG <10% OG re-moval YR | "            | H              |             | M       |
|      |    |       |    |    |          |         | MM                      | SE           | CT1, CLASS I   |             | OK      |
| 30   | 19 | 41    | HL | DH | "        |         | PS                      | SSP          | CT1, CLASS II  |             | PR,M    |
|      |    |       |    |    |          |         | PS                      | Str          |                |             | OK      |
| 31   | 18 | 21    | HL | UH | "        |         | PS                      | PStr.B       | CT1, CLASS I   |             | PR      |
|      |    |       |    |    |          |         | MM                      | SE           |                |             | OK      |
| 32   | 18 | 48    | HL | DH | "        |         | FS over VN,PS           | SSP          | CT1, CLASS I   |             | PR      |
|      |    |       |    |    |          |         | PS                      | SE           |                |             | OK      |
| 33   | 18 | 27    | HL | DH | "        |         | PS                      | FS over VN   | CT2, CLASS III |             | PR      |
|      |    |       |    |    |          |         | MM,SE                   | SE           |                |             | OK      |
| 34   | 18 | 48    | HL | DH | "        |         | avoid VN,FS             | SSP          | CT1, CLASS I   |             | PR      |
|      |    |       |    |    |          |         | MM & SE                 |              |                |             | MODIFY  |
| 35   | 18 | 12    | HL | DH | "        |         | PS                      | "            | CT2, CLASS III |             | PR,M    |
|      |    |       |    |    |          |         |                         |              |                |             | OK      |
| 36   | 18 | 22    | HL | DH | "        |         | "                       | "            | H              |             | R       |
|      |    |       |    |    |          |         | STR.B                   |              | CT1, CLASS I   |             | MODIFY  |
| 37   | 18 | 22    | HL | UH | "        |         | PS                      | FS OVER STR  | CT2, CLASS III |             | PR      |
|      |    |       |    |    |          |         | MM & SE                 | SE & STR.B   |                |             | MODIFY  |
| 38   | 18 | 58    | HL | DH | "        |         | FS over VN,PS           | FS over Str. | CT2, CLASS III |             | R,PR    |
|      |    |       |    |    |          |         |                         |              |                |             | MODIFY  |



Table 2-5a: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 4

| UNIT | RX | ACRES | LS | YD | CULTURAL | LANDS                    | SOILS                    | WATER                           | FISHERIES      | WILDLIFE    | VISUALS |
|------|----|-------|----|----|----------|--------------------------|--------------------------|---------------------------------|----------------|-------------|---------|
|      |    |       |    |    |          | PVT BND                  | TOG <10% OG re-<br>moval | Str.B & SE                      |                |             |         |
| 1    | 17 | 13    | TR | LE | CS&G     | SURVEY LL                | YR                       | PStr & FP                       | CT1, CLASS I   | ERET        | OK      |
| 2    | 17 | 13    | TR | LE | "        | "                        | "                        | "                               | CT1, CLASS I   | ERET        | OK      |
| 3    | 19 | 29    | HL | DH | "        | MM & SE                  | FS over VN, SP           | SE                              | CT2, CLASS III |             | PR      |
| 4    | 18 | 12    | HL | UH | "        | PS                       | SE                       | -                               | CT1, CLASS I   | ERET        | OK      |
| 5    | 19 | 38    | HL | DH | "        | MM & SE                  | FS over VN, PS           | SE                              | CT2, CLASS III |             | PR, M   |
| 6    | 18 | 24    | HL | UH | "        | SE                       | PS                       | -                               | CT2, CLASS III | ERET        | OK      |
| 7    | 18 | 31    | HL | UH | "        | "                        | "                        | "                               | CT2, CLASS III |             | PR      |
| 8    | 18 | 65    | HL | UH | "        | PS                       | MM, VN slopes >15%       | SE & Str.B<br>PStr, FS over Str | CT1, CLASS I   | ERET        | MODIFY  |
| 9    | 18 | 19    | HL | UH | "        | FS over VN               | MM, SE                   | "                               | CT1, CLASS II  |             | MODIFY  |
| 10   | 18 | 45    | HL | DH | "        | FS over VN, PS           | MM, SE                   | SE                              | CT1, CLASS II  |             | PR      |
| 11   | 18 | 48    | HL | DH | "        | "                        | "                        | "                               | CT1, CLASS I   |             | MODIFY  |
| 12   | 18 | 27    | HL | DH | "        | PS                       | -                        | -                               | CT2, CLASS III |             | PR      |
| 13   | 18 | 12    | HL | DH | "        | MM                       | PS                       | SE                              | CT2, CLASS III |             | OK      |
| 14   | 18 | 43    | HL | DH | "        | "                        | "                        | "                               | CT1, CLASS I   |             | PR, M   |
| 15   | 18 | 58    | HL | DH | "        | MM & SE                  | FS over VN, PS           | SE & Str                        | CT2, CLASS III |             | MODIFY  |
| 16   | 17 | 85    | HL | DH | "        | "                        | "                        | SE                              | CT1, CLASS I   | ERET        | PR, M   |
| 17   | 19 | 61    | TR | LE | "        | TOG <10% OG re-<br>moval | YR                       | PFP & SSP                       | CT1, CLASS I   |             | OK      |
| 18   | 19 | 20    | HL | DH | "        | MM & SE                  | FS over VN, PS           | SE & Str.B<br>PStr, B           | CT1, CLASS I   | ERET        | M       |
| 19   | 19 | 48    | TR | LE | "        | TOG <10% OG re-<br>moval | YR                       | SE & Str.B<br>PStr, B FS        | CT2, CLASS III | ERET, GOOSE | OK      |
| 20   | 19 | 22    | HL | DH | "        | TOG, MM slopes >15%      | PMM, <10% OG removal     | "                               | CT1, CLASS I   |             | M       |
|      |    |       |    |    |          |                          |                          |                                 | CT1, CLASS I   |             | OK      |



**Table 2-5b: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 4**

| UNIT | RX | ACRES | LS | YD | CULTURAL | LANDS | SOILS                       | WATER                       | FISHERIES      | WILDLIFE | VISUALS |
|------|----|-------|----|----|----------|-------|-----------------------------|-----------------------------|----------------|----------|---------|
| 21   | 19 | 37    | TR | LE | CS&G     |       | TOG <10 OG re-<br>moval YR  | STR.B & SE<br>PS over STR.B | CT1, CLASS I   |          | M<br>OK |
| 22   | 19 | 67    | TR | LE | "        |       | TOG <10% OG re-<br>moval YR | SE<br>SSP                   | CT1, CLASS I   |          | M<br>OK |
| 23   | 19 | 32    | HL | UH | "        |       | MM below unit<br>PS         | "                           | CT2, CLASS III |          | M<br>OK |
| 24   | 19 | 11    | HL | UH | "        |       | "                           | STR.B<br>PSTR.B by FS       | CT1, CLASS I   |          | M<br>OK |
| 25   | 19 | 33    | TR | LE | "        |       | TOG <10% OG re-<br>moval YR | "                           | CT1, CLASS I   |          | M<br>OK |
| 26   | 19 | 30    | TR | LE | "        |       | TOG <10% OG re-<br>moval YR | "                           | CT1, CLASS I   |          | M<br>OK |
| 27   | 19 | 52    | TR | LE | "        |       | MM<br>PS                    | SE<br>SSP                   | CT2, CLASS III | GOOSE    | M<br>OK |
| 28   | 19 | 24    | HL | UH | "        |       | MM<br>PS                    |                             | CT2, CLASS III |          | M<br>OK |

Table 2-6a: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 5

| UNIT | RX | ACRES | LS | YD | CULTURAL | LANDS                | SOILS                       | WATER                       | FISHERIES      | WILDLIFE    | VISUALS         |
|------|----|-------|----|----|----------|----------------------|-----------------------------|-----------------------------|----------------|-------------|-----------------|
| 1    | 17 | 13    | TR | LE | UNSURVD  | PVT BND<br>SURVEY LL | TOG <10% OG re-<br>moval YR | Str.B & SE<br>P.Str.B & FP  | CT1, CLASS I   |             | M               |
| 2    | 19 | 29    | HL | DH | "        |                      | MM & SE<br>FS over VN, PS   | SE<br>SSP                   | CT2, CLASS III |             | PR<br>OK        |
| 3    | 18 | 12    | HL | UH | "        |                      | SE<br>PS                    | -<br>SSP & PStr             | CT1, CLASS I   | ERET        | R, PR<br>OK     |
| 4    | 18 | 7     | HL | DH | "        |                      | MM & SE<br>FS over VN, PS   | SE<br>SSP                   | CT1, CLASS I   | ERET        | R<br>OK         |
| 5    | 18 | 24    | HL | UH | "        |                      | -<br>PS                     | -<br>SSP                    | CT2, CLASS III | ERET        | PR<br>OK        |
| 6    | 18 | 31    | HL | UH | "        |                      | -<br>PS                     | -<br>SSP                    | CT2, CLASS III |             | PR<br>MODIFY    |
| 7    | 18 | 36    | HL | UH | "        |                      | -<br>PS                     | Str & SE<br>PS over Str.SSP | CT1, CLASS I   | ERET        | PR<br>MODIFY    |
| 8    | 18 | 49    | HL | DH | "        |                      | MM & SE<br>FS over VN, PS   | SE + Str B<br>PS over Str   | CT1, CLASS II  |             | PR<br>MODIFY    |
| 9    | 18 | 45    | HL | DH | "        |                      | "                           | SE<br>SSP                   | CT2, CLASS III |             | PR<br>MODIFY    |
| 10   | 15 | 33    | TR | LE | "        |                      | TOG <10% OG re-<br>moval YR | STR.B<br>PStr.B, FS         | CT1, CLASS I   | ERET, GOOSE | M<br>OK         |
| 11   | 15 | 38    | TR | LE | "        |                      | TOG <10% OG re-<br>moval YR | "                           | CT1, CLASS I   |             | M<br>OK         |
| 12   | 19 | 41    | HL | DH | "        |                      | MM<br>PS                    | -<br>SSP                    | CT1, CLASS II  |             | PR, M<br>OK     |
| 13   | 18 | 48    | HL | DH | "        |                      | MM & SE<br>FS over VN, PS   | SE<br>SSP                   | CT1, CLASS I   |             | PR<br>OK        |
| 14   | 18 | 27    | HL | DH | "        |                      | MM<br>PS                    | SE<br>SSP                   | CT2, CLASS III |             | PR<br>OK        |
| 15   | 18 | 12    | HL | DH | "        |                      | MM<br>PS                    | SE<br>SSP                   | CT2, CLASS III |             | PR, M<br>OK     |
| 16   | 18 | 22    | HL | DH | "        |                      | MM<br>PS                    | SE<br>SSP                   | CT1, CLASS I   |             | R<br>MODIFY     |
| 17   | 18 | 22    | HL | UH | "        |                      | -<br>PS                     | Str.B<br>PSLr. B.           | CT2, CLASS III |             | PR<br>MODIFY    |
| 18   | 18 | 58    | HL | DH | "        |                      | MM & SE<br>FS over VN, PS   | SE<br>SSP                   | CT2, CLASS III |             | R, PR<br>MODIFY |
| 19   | 17 | 85    | HL | DH | "        |                      | MM & SE<br>PS, FS over VN   | SE, SLr<br>SSP & PSLr       | CT1, CLASS I   | ERET        | PR, M<br>OK     |
| 20   | 19 | 98    | TR | LE | "        |                      | TOG <10% OG re-<br>moval YR | SLr<br>FS over SLr.         | CT1, CLASS I   | ERET        | M<br>OK         |

Table 2-6b: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 5

| UNIT | RX | ACRES | LS | YD | CULTURAL | LANDS   | SOILS   | WATER               | FISHERIES         | WILDLIFE | VISUALS |
|------|----|-------|----|----|----------|---------|---|---------------------|-------------------|----------|---------|
| 21   | 19 | 22    | HL | DH | CS&G     | UNSURVD | MM slopes >45%<br>PS, FS over VN                    | SE<br>SSP           | CT1, CLASS I      |          | M<br>OK |
| 22   | 19 | 27    | HL | DH | "        | "       | "   | "                   | CT2, CLASS III    |          | M<br>OK |
| 23   | 19 | 37    | TR | LE | "        | "       | TOG <10% OG re-<br>moval YR                         | Str<br>FS over Str. | H<br>CT1, CLASS I |          | M<br>OK |
| 24   | 19 | 67    | TR | LE | "        | "       | MM slopes >45% & TOG<br>FS over VN, <10% OG removal | SE<br>SSP & PStr    | CT1, CLASS I      |          | M<br>OK |
| 25   | 19 | 32    | HL | UH | "        | "       | MM slopes >45%<br>FS over VN                        | SE<br>SSP & PStr    | CT1, CLASS I      |          | M<br>OK |
| 26   | 19 | 11    | HL | UH | "        | "       | MM<br>PS  | SE<br>SSP           | CT2, CLASS III    |          | M<br>OK |
| 27   | 19 | 33    | TR | LE | "        | "       | TOG <10 OG re-<br>moval YR                          | Str.<br>PStr.       | CT1, CLASS I      |          | M<br>OK |
| 28   | 19 | 30    | TR | LE | "        | "       | "   | "                   | CT1, CLASS I      |          | M<br>OK |
| 29   | 19 | 52    | TR | LE | "        | "       | "   | "                   | H<br>CT1, CLASS I |          | M<br>OK |
| 30   | 19 | 24    | HL | UH | "        | "       | MM<br>PS  | SE<br>SSP           | CT2, CLASS III    | GOOSE    | M<br>OK |
| 31   | 15 | 25    | TR | LE | "        | "       | TOG <10% OG re-<br>moval YR                         | Str<br>PStr         | H<br>CT1, CLASS I |          | M<br>OK |
| 32   | 15 | 65    | TR | LE | "        | "       | "   | "                   | H<br>CT1, CLASS I |          | M<br>OK |

Table 2-7a: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 6

| UNIT | RX | ACRES | US | YD | CULTURAL | LANDS     | SOILS                | WATER          | FISHERIES      | WILDLIFE    | VISUALS |
|------|----|-------|----|----|----------|-----------|----------------------|----------------|----------------|-------------|---------|
|      |    |       |    |    | UNSURVD  | PVT BND   | TOG <10% OG re-moval | SLRB & SE      |                |             |         |
| 1    | 17 | 13    | TR | LE | CS&G     | SURVEY LL | YR                   | PSLR.B PP      | CT1, CLASS I   |             | M       |
|      |    |       |    |    |          |           | MM & SE              | SE             |                |             | PR      |
| 2    | 19 | 29    | UL | DH | "        |           | PS,FS over VN        | SSP            | CT2, CLASS III |             | OK      |
|      |    |       |    |    |          |           | -                    | SE & Str       |                |             | R,PR    |
| 3    | 18 | 12    | UL | UH | "        |           | PS                   | SSP & PSLR     | CT1, CLASS I   | ERET        | OK      |
|      |    |       |    |    |          |           | "                    | -              |                |             | R       |
| 4    | 18 | 7     | UL | DH | "        |           | "                    | SSP            | CT1, CLASS I   | ERET        | OK      |
|      |    |       |    |    |          |           | "                    | "              |                |             | PR      |
| 5    | 18 | 24    | UL | UH | "        |           | "                    | "              | CT2, CLASS III | ERET        | OK      |
|      |    |       |    |    |          |           | "                    | "              |                |             | PR      |
| 6    | 18 | 31    | UL | UH | "        |           | "                    | "              | CT2, CLASS III |             | MODIFY  |
|      |    |       |    |    |          |           | SE                   | SE & Str       |                |             | PR      |
| 7    | 18 | 36    | UL | UH | "        |           | PS                   | PSLR & SLRB    | CT1, CLASS I   | ERET        | MODIFY  |
|      |    |       |    |    |          |           | MM                   | SE & Str       |                |             | PR      |
| 8    | 18 | 49    | UL | DH | "        |           | PS, FS over VN       | PSLR           | CT1, CLASS II  |             | MODIFY  |
|      |    |       |    |    |          |           | MM                   | SE             |                |             | PR      |
| 9    | 18 | 45    | UL | DH | "        |           | PS                   | FS over Str&VN | CT2, CLASS III |             | MODIFY  |
|      |    |       |    |    |          |           | TOG <10% OG re-moval | Str            |                |             | M       |
| 10   | 15 | 33    | TR | LE | "        |           | YR                   | PSLR & SLRB    | CT1, CLASS I   | ERET, GOOSE | OK      |
|      |    |       |    |    |          |           | "                    | "              |                |             | M       |
| 11   | 15 | 21    | TR | LE | "        |           | "                    | "              | CT1, CLASS I   |             | OK      |
|      |    |       |    |    |          |           | MM                   | SE             |                |             | PR,M    |
| 12   | 15 | 41    | UL | DH | "        |           | PS                   | SSP            | CT1, CLASS II  |             | OK      |
|      |    |       |    |    |          |           | MM                   |                |                |             | PR      |
| 13   | 18 | 48    | UL | DH | "        |           | FS over VN,PS        | "              | CT1, CLASS I   |             | OK      |
|      |    |       |    |    |          |           | "                    | "              |                |             | PR      |
| 14   | 18 | 27    | UL | DH | "        |           | "                    | "              | CT2, CLASS III |             | OK      |
|      |    |       |    |    |          |           | MM                   |                |                |             | PR,M    |
| 15   | 18 | 12    | UL | DH | "        |           | PS                   | "              | CT2, CLASS III |             | OK      |
|      |    |       |    |    |          |           | "                    | "              |                |             | R       |
| 16   | 18 | 22    | UL | DH | "        |           | "                    | "              | CT1, CLASS I   |             | MODIFY  |
|      |    |       |    |    |          |           | -                    | SLR            |                |             | PR      |
| 17   | 18 | 22    | UL | UH | "        |           | PS                   | PSLR & SLR B   | CT2, CLASS III |             | MODIFY  |
|      |    |       |    |    |          |           | MM                   | SE             |                |             | R,PR    |
| 18   | 18 | 58    | UL | DH | "        |           | FS over VN, PS       | SSP            | CT2, CLASS III |             | MODIFY  |
|      |    |       |    |    |          |           | MM & SE              | SLR B          |                |             | PR,M    |
| 19   | 17 | 85    | UL | DH | "        |           | FS over VN,PS        | FS over SLRB   | CT1, CLASS I   | ERET        | OK      |
|      |    |       |    |    |          |           | TOG <10% OG re-moval | SLR & SLRB     |                |             | M       |
| 20   | 19 | 61    | TR | LE | "        |           | YR                   | PSLR.B, FS     | CT1, CLASS I   | ERET        | OK      |



Table 2-7b: Resource Concerns and Mitigation Measures for Timber Harvest Units Under Alternative 6

| UNIT | RX | ACRES | LS | YD | CULTURAL | LANDS | SOILS                       | WATER                       | FISHERIES         | WILDLIFE    | VISUALS      |
|------|----|-------|----|----|----------|-------|-----------------------------|-----------------------------|-------------------|-------------|--------------|
| 21   | 19 | 20    | HL | DH | CS&G     |       | MM & SE<br>PS, FS over VN   | SE<br>SSP                   | CT2, CLASS III    | ERET, GOOSE | M<br>OK      |
| 22   | 19 | 44    | TR | LE | "        |       | TOG <10% OG re-<br>mova1 YR | Str<br>PStr & Str.B         | H<br>CT1, CLASS I |             | M<br>OK      |
| 23   | 19 | 37    | TR | LE | "        |       | "                           | "                           | H<br>CT1, CLASS I | GOOSE       | M<br>OK      |
| 24   | 19 | 41    | HL | DH | "        |       | MM<br>PS, FS over VN        | SE<br>SSP                   | CT2, CLASS III    |             | M<br>OK      |
| 25   | 19 | 72    | HL | DH | "        |       | "                           | SE & Str<br>PStr & StrB.SSP | CT1, CLASS I      |             | M<br>OK      |
| 26   | 17 | 21    | HL | UH | "        |       | SE<br>PS                    | -<br>SSP                    | CT2, CLASS III    | ERET, GOOSE | PR<br>MODIFY |
| 27   | 19 | 28    | HL | UH | "        |       | "                           | "                           | CT2, CLASS III    | GOOSE       | M<br>OK      |
| 28   | 19 | 52    | TR | LE | "        |       | TOG <10% OG re-<br>mova1 YR | SE & Str<br>PStr & StrB     | H<br>CT1, CLASS I |             | M<br>OK      |
| 29   | 15 | 25    | TR | LE | "        |       | "                           | "                           | H<br>CT1, CLASS I |             | M<br>OK      |
| 30   | 15 | 65    | TR | LE | "        |       | "                           | "                           | CT1, CLASS I      |             | M<br>OK      |
| 31   | 19 | 24    | HL | UH | "        |       | SE<br>PS                    | -<br>SSP                    | CT2, CLASS III    | GOOSE       | M<br>OK      |
| 32   | 18 | 41    | HL | DH | "        |       | MM<br>PS, FS over VN        | SE<br>SSP                   | CT1, CLASS I      |             | M<br>OK      |
| 33   | 18 | 26    | HL | UH | "        |       | -<br>PS                     | SE<br>SSP & PStr            | CT1, CLASS I      | GOOSE       | M<br>OK      |
| 34   | 18 | 49    | HL | DH | "        |       | MM & SE<br>PS, FS over VN   | Str<br>SSP & PStr           | CT2, CLASS III    | ERET        | M<br>OK      |

Table 2-8: Resource Concerns and Mitigation Measures for Precommercial Thinning Areas Under Alternatives 2-6.

| STANDID | RX | ACRES | CULTURAL | LANDS | SOILS | WATER | FISHERIES | WILDLIFE | VISUALS             |
|---------|----|-------|----------|-------|-------|-------|-----------|----------|---------------------|
| 2605    | 19 | 7     |          |       |       |       | CLASS I   |          | OK                  |
| 3911    | 19 | 46    |          |       |       |       | CLASS I   |          | OK                  |
| 3978    | 19 | 67    |          |       |       |       | CLASS I   |          | OK                  |
| 413     | 19 | 65    |          |       |       |       | CLASS I   |          | OK                  |
| 6890    | 19 | 113   |          |       |       |       | CLASS I   |          | OK                  |
| 10486   | 19 | 75    |          |       |       |       | CLASS I   |          | OK                  |
| 10521   | 19 | 27    |          |       |       |       | CLASS I   |          | OK                  |
| 2442    | 17 | 268   |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 2714    | 17 | 42    |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 2913    | 17 | 12    |          |       |       |       |           | WILDTN   | OK                  |
| 3982    | 17 | 14    |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 4020    | 17 | 169   |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 6111    | 17 | 340   |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 8299    | 17 | 24    |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 8390    | 17 | 222   |          |       |       |       | CLASS I   | WILDTN   | 100' NTZ FROM BEACH |
| 8471    | 17 | 16    |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 10477   | 17 | 15    |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 10485   | 17 | 8     |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 10583   | 17 | 335   |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 10532   | 17 | 56    |          |       |       |       | CLASS I   | WILDTN   | OK                  |
| 10676   | 17 | 55    |          |       |       |       | CLASS I   | WILDTN   | OK                  |

# DRAFT

## BIG ISLANDS MANAGEMENT AREA

NORTH MONTAGUE ISLAND PORTION



## PROPOSED PRECOMMERCIAL THINNING UNITS

with  
Stand ID Numbers  
*ALTERNATIVES 2 - 6*

### LEGEND

 STATE SELECTION BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 16, 1989

1848

W. D. G.  
C. D. G.  
D. D. G.



# DRAFT

## BIG ISLANDS MANAGEMENT AREA

*SOUTH MONTAGUE ISLAND PORTION*



## PROPOSED PRECOMMERCIAL THINNING UNITS

with  
Stand ID Numbers  
*ALTERNATIVES 2 - 6*

### LEGEND

 OWNERSHIP BOUNDARY

SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 16, 1989

DRAFT

MEMORANDUM  
FOR THE RECORD  
SUBJECT: [Illegible]

# DRAFT

## BIG ISLANDS MANAGEMENT AREA

*SOUTH MONTAGUE ISLAND PORTION*



## PROPOSED HARVEST UNITS

with  
Harvest Unit Numbers

*ALTERNATIVE 2*

### LEGEND

OWNERSHIP BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 10, 1969





# DRAFT

## BIG ISLANDS MANAGEMENT AREA

*SOUTH MONTAGUE ISLAND PORTION*



## PROPOSED HARVEST UNITS

with  
Harvest Unit Numbers

*ALTERNATIVE 3*

### LEGEND

▧ OWNERSHIP BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 16, 1989



# DRAFT

## BIG ISLANDS MANAGEMENT AREA

*SOUTH MONTAGUE ISLAND PORTION*



## PROPOSED HARVEST UNITS

with  
Harvest Unit Numbers

*ALTERNATIVE 4*

### LEGEND

▧ OWNERSHIP BOUNDARY

SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 16, 1989

13450

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# DRAFT

## BIG ISLANDS MANAGEMENT AREA

SOUTH MONTAGUE ISLAND PORTION



## PROPOSED HARVEST UNITS

with  
Harvest Unit Numbers

ALTERNATIVE 5

### LEGEND

OWNERSHIP BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 16, 1989



# DRAFT

## BIG ISLANDS MANAGEMENT AREA

SOUTH MONTAGUE ISLAND PORTION



## PROPOSED HARVEST UNITS

with  
Harvest Unit Numbers

ALTERNATIVE 6

### LEGEND

OWNERSHIP BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 16, 1989

## 2 Alternatives

### **Alternative 3**

During the planning period, Alternative 3 (Maps K,O,R, and V) concentrates most of the management area resource development between MacLeod Harbor and San Juan Bay on Montague Island. This alternative was developed to:

1. separate Forest Service management from private land management and minimize the cumulative effects of timber management in the Nellie Martin River area;
2. maintain and enhance high-value fish and wildlife habitat capability;
3. produce a high level of timber for local industry;
4. provide a more developed recreation experience by adding new recreation facilities and by taking advantage of opportunities to combine access needs for timber management and recreation development.

### **Access**

The transportation system, which would serve only Chugach National Forest resources, would be constructed with an emphasis on the southwest part of Montague Island between MacLeod Harbor and San Juan Bay to accomodate resource development and public use (Map K). It would consist of:

- \* 46.0 miles of roads
- \* 6 miles of nonmotorized trails
- \* 2 airstrip feasibility studies
- \* 2 trailhead parking areas
- \* 1 anchor buoy
- \* 3 saltwater access points
- \* 1 log transfer facility

The road system in the MacLeod Harbor and San Juan Bay areas would consist of 11.6 miles of arterial, 2.9 miles of collector, 22.0 miles of local, and 9.5 miles of temporary roads.

The log transfer facility would be located on the south side of MacLeod Harbor.

Airstrip feasibility studies would be conducted at MacLeod Harbor and Nellie Martin River areas.

One anchor buoy would be installed in Zaikof Bay.

Hunters and hikers would have improved access to alpine areas on south end of Montague Island above MacLeod Harbor and San Juan Bay.

Saltwater access (shown as boat launching facility on maps) would be provided for boat launching at MacLeod Harbor and San Juan Bay.

Six miles of nonmotorized trail would be constructed in the MacLeod Harbor, San Juan Bay, Jeanie Cove, and Stump Lake areas.



Opportunities for four-wheel drive vehicle and all-terrain vehicle use are increased because of increased roading in the MacLeod Harbor-San Juan Bay areas.

Trailhead parking areas would be provided in the MacLeod Harbor and San Juan Bay areas.

### **Fish and Wildlife**

No timber harvest is proposed in subunits 36 and 37 (Map 2) to maintain mature forest wildlife habitat on the southeast side of Montague Island.

Wildlife and fish habitat in the Nellie Martin River priority #1 stream habitat zone (Map B) would be maintained by avoiding any ground disturbing activity in this area. Harvest in San Juan River priority #1 stream habitat zone would be limited to areas without substantial braided channel habitat.

Studies would be completed for eight potential fish habitat improvement sites (Table 2-2 and Map K). An estimated 201,400 pounds of fish would be produced annually if all projects were found feasible and were implemented.

### **Timber**

Approximately 30.9 million board feet of mature to over-mature sawtimber on 1,014 acres of suitable forest land (Map K) would be harvested using the clearcut regeneration system. This represents 4.7 percent of the mature to over-mature CFL on National Forest lands on Montague Island or 1.6 percent of the mature to over-mature CFL in the management area that would be harvested during the planning period.

Eighty-eight percent of the harvest acreage would be harvested by conventional cable systems. The remaining 12 percent would be harvested by tractor. Harvest unit size ranges from six to 60 acres with an average size of 27 acres.

### **Timber Mitigation Measures**

The specific mitigation measures to be applied to individual cutting units (Maps 32) is contained in tables 2-4 and 2-8.

### **Recreation**

Visitor use levels would be expected to increase fifteen percent over present use.

In addition to those cabins proposed in alternative 2, new recreation facilities would include installation of a tent platform, pad, or shelter at San Juan Bay and interpretive sites at MacLeod Harbor and San Juan Bay (Map K).

## 2 Alternatives

### **Alternative 4**

During the planning period Alternative 4 (Map L,O,S, and V) disperses forest management activities around the southern end of Montague Island from MacLeod Harbor to Patton Bay.

This alternative was developed to:

1. coordinate access to meet National Forest and private needs;
2. disperse activities to maintain fish and wildlife habitat capability;
3. limit the cumulative effects of timber management in the Nellie Martin River area;
4. produce a volume of timber harvest consistent with other objectives to supply local industry.
5. increase road and trail-related recreation opportunities;
6. enhance commercial and sport fisheries opportunities.

### **Access**

The transportation system (Map L) would be expanded with an emphasis on the south end of Montague Island to accommodate resource development and public use. This consists of:

- \* 57.6 miles of roads
- \* 14 miles of nonmotorized trails
- \* 2 airstrip feasibility studies
- \* 6 trailhead parking areas
- \* 1 anchor buoy
- \* 3 saltwater access points

The road system would connect private land at MacLeod Harbor to private land at Patton Bay across National Forest System land. It consists of 34.5 miles of arterial, 2.9 miles of collector, 13.4 miles of local and 6.8 miles of temporary roads. The arterial road would be constructed under a cost-share agreement between the Forest Service and CAC.

Development of the arterial road could be implemented independent of proposed National Forest activity and without Forest Service participation in funding.

A log transfer facility would be located on private land on the north side of MacLeod Harbor and would serve both National Forest and private land owner needs.

Nonmotorized trails would be constructed in the MacLeod Harbor, San Juan Bay, Jeanie Cove, Stump Lake and Nellie Martin River areas.

Airstrip feasibility studies would be conducted for sites in MacLeod Harbor and Patton Bay.

One anchor buoy would be installed at Zaikof Bay.

Trailhead parking areas would be constructed at MacLeod Harbor, San Juan Bay, Jeanie Cove and Stump Lake.

Saltwater access (shown as boat launching facility on maps) would be provided at MacLeod Harbor and San Juan Bay.

## **Fish and Wildlife**

Timber management would occur with the emphasis on maintaining fish and wildlife habitat capability on the southwest side of Montague Island (sub unit 35) and in the Nellie Martin River drainage (subunit area 37) (Map 2).

No timber harvest or roading would occur in high-value, low-elevation deer winter range in Jeanie Cove. Wildlife and fish habitat capability would be maintained in the San Juan River and Nellie Martin River priority #1 Stream Habitat Zones (Map B) by avoiding ground disturbing activities in those areas.

Studies would be completed for 14 potential fish habitat improvement sites (Table 2-2 and Maps L and O). An estimated 221,700 pounds of fish would be produced annually if all projects were found feasible and were implemented.

## **Timber**

Approximately 28.6 mmbf of mature to over-mature sawtimber on 999 acres of suitable forest land would be harvested using the clearcut regeneration system (Map L). This represents 4.6 percent of the mature to over-mature CFL on National Forest system lands on Montague Island or 1.6 percent of the mature to over-mature CFL in the management area that would be harvested during the planning period.

Sixty-five percent of the harvest acreage would be harvested by conventional cable systems. The remaining 35 percent would be harvested by tractor. Harvest unit size ranges from 11 to 85 acres with an average size of 37 acres.

## **Timber Mitigation Measures**

The specific mitigation measures to be applied to individual cutting units (Maps 33) is contained in tables 2-5 and 2-8.

## **Recreation**

This alternative provides for more developed recreation than Alternatives 2 and 3. This would be accomplished by integrating access needs for timber management and recreation development from MacLeod Harbor to Patton Bay.

Visitor use levels would increase approximately 25% over current levels as a result of additional road access and trails. A nonmotorized trail from Stump Lake to Nellie Martin River and foot trails from cabins at Stump Lake and Jeanie Cove connecting to the arterial road would provide hiking, fishing, hunting, photography and other opportunities for enjoying the south end of Montague Island.



## 2 Alternatives

Opportunities for interpretation are presented by resource management activities at MacLeod Harbor and San Juan Bay.

In addition to the recreation projects in alternative 3, this alternative would develop two tent platforms, pads, or shelters in the Nellie Martin River area and an additional interpretive site at Jeanie Cove (Maps L and O).



## Alternative 5 - Proposed Action

Alternative 5 (Maps M,O,T,and V) proposes high levels of management activities for all resources on south Montague Island, with a significant emphasis on the recreation resource. It was developed to:

1. create a recreation destination on south Montague Island to meet  
anticipated growth for recreation and tourism in Prince William Sound;
2. provide increased diversification to the local economy through a  
combination of timber, recreation and fisheries developments;
3. maintain high-value fish and wildlife habitat capabilities;
4. coordinate access to meet National Forest and private needs;
5. limit the cumulative effects of timber management in the Nellie Martin  
River area.

It recognizes the recreation potential of Prince William Sound to meet the growth in recreation and tourism in southcentral Alaska. Additional recreation developments or services would be directed to either the Forest Service permitted lodge at MacLeod Harbor or partnerships with private interests to provide visitor facilities at MacLeod Harbor, San Juan Bay, and Patton Bay. The Forest Service would cooperate with the private land owner to develop cultural resource interpretation sites. A complete list of the proposed recreation activities and facilities is found in Table 2-9a-d

### Access

The transportation system (Map M) continues the emphasis on the south end of Montague Island to accommodate resource development and public use. This consists of:

- \* 62.3 miles of roads
- \* 26.25 miles of nonmotorized trails
- \* 7 miles of motorized trails
- \* 5 airstrip feasibility studies
- \* 7 trailhead parking areas
- \* 1 anchor buoy
- \* 3 saltwater access points

The road system would connect private land at MacLeod Harbor to private land at Patton Bay across National Forest system land and consists of 34.5 miles of arterial, 3.9 miles of collector, 15.9 miles of local and 8.0 miles of temporary roads. The arterial road would be constructed under a cost-share agreement between the Forest Service and CAC.

## 2 Alternatives

Development of the arterial road could be implemented independent of proposed National Forest activity and without Forest Service participation in funding.

A log transfer facility would be located on private land on the north side of MacLeod Harbor and would serve both National Forest and private land owner needs.

Nonmotorized trails would be constructed in the MacLeod Harbor, San Juan Bay, Jeanie Cove, Stump Lake, Nellie Martin River areas and along the ridgeline from San Juan Bay to MacLeod Harbor.

A seven-mile motorized trail would be constructed from MacLeod Harbor to connect with the main road in the upper reaches of the Nellie Martin River drainage.

Airstrip feasibility studies would be conducted for sites in San Juan Bay, Jeanie Cove, Patton Bay, Beach River and MacLeod Harbor.

One anchor buoy would be installed in Zaikof Bay.

Trailhead parking areas would be constructed at MacLeod Harbor, San Juan Bay, Jeanie Cove, Nellie Martin River, and Stump Lake.

Saltwater access (shown as boat launching facility in maps) would be provided at MacLeod Harbor and San Juan Bay.

### **Fish and Wildlife**

Timber harvest would occur with emphasis on maintaining fish and wildlife habitat capability on the southwest side of Montague Island (subunit 35) and in the Nellie Martin River drainage (subunit 37) (Map 2).

No timber harvest or roading would occur in high-value, low-elevation deer winter range in Jeanie Cove. Harvest in the San Juan River and Nellie Martin River priority #1 Stream Habitat Zones (Map B) would be limited to areas without substantial braided channel habitat.

Studies would be completed for 14 potential fish habitat improvement sites (Table 2-2 and Maps M and O). An estimated 221,700 pounds of fish would be produced annually if all projects were found feasible and were implemented.

### **Timber**

Approximately 36.0 mmbf of mature to over-mature sawtimber on 1,151 acres of suitable forest land would be harvested using the clearcut regeneration system (Map M). This represents 5.3 percent of the mature to over-mature CFL on Montague Island or 1.8 percent of the mature to over-mature CFL in the management area that would be harvested during the planning period.

Fifty-seven percent of the harvest acreage would be harvested by conventional cable systems. The remaining 43 percent would be harvested by tractor. Harvest unit size ranges from seven to 98 acres with an average size of 36 acres.

### **Timber Mitigation Measures**

The specific mitigation measures to be applied to individual cutting units (Maps 34) is contained in tables 2-6 and 2-8.

## **Recreation:**

A higher level of recreation facilities and services would be provided through partnerships with the private sector and Forest Service investments.

New recreation opportunities (see Maps M and O) would include all the facilities proposed in Alternative 4 plus:

- a 20-unit campground at MacLeod Harbor;
- three recreation cabins in the upper reaches of Nellie Martin River;
- recreation cabins at Rocky Bay and Zaikof Bay;
- evaluate the feasibility of a third recreation cabin on Montague Lagoon.

Based upon the anticipated increase in tourism, expand overnight facilities and other services at MacLeod Harbor. New services would be considered including recreational vehicle rentals (e.g. boats, passenger vehicles, ATVs), food and fuel service/sales, tour boat operations, flightseeing trips, and guided fishing and backpacking trips. Depending on the outcome of a feasibility study, the area used by the local air charter service to land aircraft at MacLeod Harbor could be improved and maintained. All additional developments and services could occur on National Forest System lands, on private land, or a combination of the two.

Visitor use levels on south Montague Island are expected to increase by more than 115 percent as a result of the combined effects of increased tourism in Prince William Sound, the development of a transportation system on the island, and the development of additional private/public recreation facilities and services.



## 2 Alternatives

### Alternative 6

Alternative 6 (Maps N,O,U, and V) considers development of south Montague Island with high levels of forest management activities for all resources. It was developed to:

1. coordinate access to meet National Forest and private needs using CAC's proposed road location;
2. disperse activities to maintain fish and wildlife habitat capability;
3. limit the cumulative effects of timber management in the Nellie Martin River area;
4. produce a volume of timber harvest consistent with other objectives to supply local industry.
5. increase road and trail-related recreation opportunities;
6. enhance commercial and sport fisheries opportunities.

### Access

The transportation system (Map N) continues the emphasis on the south end of Montague Island to accommodate resource development and public use. This consists of:

- \* 64.3 miles of roads
- \* 11.75 miles of nonmotorized trails
- \* 2 airstrip feasibility studies
- \* 7 trailhead parking areas
- \* 1 anchor buoy
- \* 3 saltwater access points

The road system would connect private land at MacLeod Harbor to private land at Patton Bay across National Forest system land and consists of 34.8 miles of arterial, 5.0 miles of collector, 16.0 miles of local and 8.5 miles of temporary roads. The arterial road would be constructed under a cost-share agreement between the Forest Service and CAC.

Development of the arterial road could be implemented independent of proposed National Forest activity and without Forest Service participation in funding.

A log transfer facility would be located on private land on the north side of MacLeod Harbor and would serve both National Forest and private land owner needs.

Nonmotorized trails would be constructed in the MacLeod Harbor, San Juan Bay, Jeanie Cove, Stump Lake, and Nellie Martin River areas.

Airstrip feasibility studies would be conducted for sites in Patton Bay and MacLeod Harbor.

One anchor buoy would be installed in Zaikof Bay.



Trailhead parking areas would be constructed at MacLeod Harbor, San Juan Bay, Jeanie Cove, and Stump Lake.

Saltwater access (shown as boat launching facility on maps) would be provided at MacLeod Harbor and San Juan Bay.

## **Fish and Wildlife**

Timber harvest would occur with emphasis on maintaining fish and wildlife habitat capability on the southwest side of Montague Island (subunit 35) and in the Nellie Martin River drainage (subunit 37) (Map 2).

Harvest within the San Juan River and Nellie Martin River priority #1 Stream Habitat Zones (Map B) would be limited to areas without substantial braided channel habitat.

Studies would be completed for 14 potential fish habitat improvement sites (Table 2-2 and Maps N and O). An estimated 221,700 pounds of fish would be produced annually if all projects were found feasible and were implemented.

## **Timber**

Approximately 36.5 mmbf of mature to over-mature sawtimber on 1,219 acres of suitable forest land would be harvested using the clearcut regeneration system (Map N). This represents 5.6 percent of the mature to over-mature CFL on Montague Island or 1.9 percent of the mature to over-mature CFL in the management area that would be harvested during the planning period.

Seventy-one percent of the harvest acreage would be harvested by conventional cable systems. The remaining 29 percent would be harvested by tractor. Harvest unit size ranges from seven to 85 acres with an average size of 36 acres.

## **Timber Mitigation Measures**

The specific mitigation measures to be applied to individual cutting units (Maps 35) is contained in tables 2-7 and 2-8.

## **Recreation**

The recreation experience and development proposed are the same as Alternative 4 except that this alternative (Map N and O) includes road access to the cabin at Jeanie Cove and adds an interpretive site in the Nellie Martin River Area.

## Comparison of Alternatives

This section briefly compares the different outputs and environmental consequences of the alternatives and summarizes their differences. Table 2 displays the various resource elements affected by the alternatives. A more detailed discussion of the environmental consequences can be found in Chapter 4.

### Special Use Permits

The management areawide Standards and Guidelines (Appendix F) provide additional direction for the management of activities that require special use permits. These Standards and Guidelines do not vary between alternatives. Outfitter/guide capacity, as measured in terms of campsites, was evaluated and remains the same for all alternatives. The increased access and facilities proposed in alternative 5 could result in more recreation special use permits.

### Minerals Issue

Under the U.S. Mining Laws, unless they are specifically withdrawn, all National Forest lands within the Big Islands are available for mineral exploration and development and oil and gas leasing in all alternatives. The southeast portion of Green Island, Little Green Island and the Needles are the only areas that may be withdrawn if the area becomes a Research Natural Area.

### Access Issue

All alternatives, except the no action alternative, increase access for recreation, timber and fisheries management. Table 2-10a compares the access provided. Alternatives 4 through 6 also provide for coordinated access management with adjacent private landowners. The proposed arterial road could be constructed independent of Forest Service management activities and could provide indirect opportunities for National Forest management activities such as a feasibility study for fish improvements.

The road and trail access in alternatives 2-6 would provide increases in recreation opportunities. These increases would be 490 RVD's for Alternatives 2 and 3, 2125 RVD's for Alternatives 4 and 6, and for Alternative 5 4300 RVD's.

Opportunities for fisheries enhancement on Montague Island would be increased by the proposed roads. As a result of improved access, alternatives 2 and 3 provide access to 4 currently inaccessible sites. Alternatives 4, 5 and 6 provide access for 10 sites in addition to the 4 accessible in Alternatives 2 and 3.

Timber resources accessed by the roads in the action alternatives vary from 18 to 31.4 percent of the total suitable forest land on Montague Island. Alternatives 5 and 6 access the largest percent of suitable forest land. Alternative 2 provides the least access. Alternative 1 does not provide for additional access.

Alternatives 2 and 3 would require one log transfer facility to be built on National Forest System land and possibly two additional facilities on private land. Development of the road system in Alternatives 4 through 6 would require only one log transfer facility which would be built on private land at MacLeod Harbor. This would reduce the effects on the marine environment since fewer log transfer facilities would be required.



### **Fish Habitat Issue**

Fish habitat on Hinchinbrook, Hawkins and Green islands would remain unchanged and would continue to provide habitat capability under all alternatives.

All alternatives contain feasibility studies for fish habitat improvements. Four of these studies are currently accessible and contained in all alternatives. Access to additional projects would be made possible by the road system in each alternative. Alternatives 2 and 3 contain an additional four studies and, if implemented, would result in an estimated output of 201,400 pounds of fish per year. Alternatives 4, 5 and 6 include 10 additional studies and, if implemented, would result in an estimated output of 221,700 pounds of fish per year.

Of the action alternatives, proposed activities on South Montague Island in alternative 2 has the least impact on the fisheries resource. Alternative 4 disperses timber harvest activities throughout the project area but proposes little harvest in priority #1 stream habitat zones. Overall impacts to the fisheries resource are almost identical for alternatives 5 and 6.

### **Wildlife Habitat Issues**

Wildlife habitat on Hinchinbrook, Hawkins and Green islands would remain unchanged and would continue to provide habitat capability under all alternatives.

#### **Deer**

Alternatives 2 through 6 would precommercially thin a total of 1568 acres of second growth with an emphasis on improving winter range habitat capability.

Alternatives 2 and 3 concentrate timber harvest in Game Management Unit 6, subunit 35 (Map 2). Alternative 4 proposes harvest in subunits 35 and 36, whereas Alternatives 5 and 6 propose harvest in all three subunits.

In Subunit 35, deep snow winter habitat capability is reduced by 9, 19, 11, 13 and 13 percent under Alternatives 2, 3, 4, 5 and 6 respectively. In subunit 36 deep snow habitat capability is reduced by approximately 13 percent under alternatives 4, 5 and 6. Reductions in deep snow winter habitat capability in subunit 37 are only 2 and 4 percent for Alternatives 5 and 6 respectively.

#### **Bear**

For the entire Montague Island, Alternatives 1, 2, 3, 4, 6 and 5 respectively would remove 0, 2, 3, 4, 6 and 7 percent (0-415 acres) of the brown bear riparian/beach fringe habitat. For south Montague Island, the Alternatives would remove 0, 4, 8, 9, 15 and 16 percent of the riparian/beach fringe habitat.

#### **Bald Eagle**

Alternative 5 proposes the greatest number of roads within 1/2 mile of eagle nests. Alternatives 6, 4, 3, and 2 respectively propose fewer roads within 1/2 mile of eagle nests. Under all alternatives eagle nests would be protected with a 330 foot wind firm buffer. However, alternatives 2 and 3 would have a harvest unit adjacent to one eagle nest buffer zone.

## 2 Alternatives

Alternatives 2 and 3 would remove the greatest percentage (9 and 7% respectively) of the beach fringe eagle nesting habitat.

### **Goose**

Goose habitat potentially impacted by the action alternatives consists of commercial forest land adjacent to muskeg meadows or ponds. Alternatives 1, 2, 3, 4, 6, and 5, respectively, would remove 0, 2, 2, 3, 3, and 4 percent of the forested habitat on Montague Island.

### **Woodpeckers**

Of the action Alternatives, Alternatives 2 through 6, respectively, would impact from four to six percent (777 to 1219 acres) of woodpecker habitat on National Forest lands on Montague Island.

### **Merganser**

From one to eleven percent (54 to 400 acres) of merganser habitat on National Forest lands on Montague Island would be harvested under the action alternatives. Alternatives 5 and 6 propose the greatest levels of harvest in riparian areas.

### **Coordinated Management Issue**

Since Alternative 1 does not include developments for access, it does not respond to the concern for improving access coordination. Forest Service management activities would not coincide with private land development within the planning period.

The access system described in Alternatives 2 and 3 would serve only National Forest System resources. National Forest Management activities would be conducted away from the private lands reducing cumulative effects over what would occur in Alternative 4 through 6 in the Patton Bay area.

Alternatives 4, 5, and 6 provide for a jointly developed access system. This would allow for coordinated use of the arterial roads and log transfer facilities. These alternatives disperse the harvest throughout South Montague Island.

Alternative 5 identifies opportunities to coordinate recreation facilities and services between the Forest and private landowners.

### **Timber Issue**

Table 2-10b gives a comparison of timber management by alternatives.

### **Supply**

Under Alternative 1, no timber management activities would occur in the Management Area. Alternative 2 through 6 concentrates all timber harvest on the southern portion of Montague Island. Total harvest volume, to supply the needs of local industry, varies from 20.9 mmbf in Alternative 2 to 36.5 mmbf in Alternative 6.

### **Precommercial Thinning**

In Alternatives 2 through 6, a total of 1568 acres of second-growth timber would be precommercially thinned under a wildlife prescription, and a total of 400 acres would be precommercially thinned under a timber production prescription.



### **Timber Sale Net Value**

Without a road cost-share agreement for construction of the arterial road system, Alternatives 2 through 6 result in a negative appraised net value. With a cost-share agreement, Alternatives 4, 5, and 6 result in a positive appraised net value, with Alternative 5 providing the greatest appraised net value.

### **Recreation Management Issue**

For all action alternatives, Primitive conditions are maintained over the entire management area with the exception of the south end of Montague Island. As a result of the varying road access provided under Alternatives 2 through 6, there is a general shift from Primitive to Semi-primitive motorized and Roded Natural recreation opportunities. Alternatives 2 and 3 would result in more Primitive opportunities while Alternatives 4, 5 and 6 would result in more motorized access. Recreation opportunities remain unchanged in Alternative 1.

Hunting and fishing opportunities would be increased the most in Alternative 5 and are somewhat less in Alternatives 4 and 6. Alternatives 2 and 3 result in fewer opportunities than 4, 5 and 6. Access would remain unchanged in Alternative 1.

Recreation facilities increase in Alternatives 3, 4, 5 and 6 (see Tables 2-9 and 2-10). Alternative 5 offers the most developed array of facilities and services as a result of opportunities afforded through partnerships.

Changes in recreation use for the Big Island Management Area range from increases of 8% over present use levels in Alternative 2 to over 100% in Alternative 5. For south Montague Island only, changes in increases in use for Alternatives 2 through 6 are, respectively, 13%, 26%, 47%, 218% and 46%.

Table 2-9a Big Islands Recreation Projects

| MONTAGUE ISLAND PROJECTS   | ALTERNATIVES |   |     |     |         |     |
|--|--------------|---|-----|-----|---------|-----|
|  | 1            | 2 | 3   | 4   | 5       | 6   |
| GENERAL  |              |   |     |     |         |     |
| Public Information Program   |              | X | X   | X   | X       | X   |
| ATV trail from MacLeod   |              |   |     |     |         |     |
| Harbor to Patton Bay (connects to rd above N. Martin) 7 miles  | -            | - | -   | -   | 7       | -   |
| Non-mtrzd ridgeline trail from ATV trail above MacLeod II to the connection at San Juan Bay 12 miles   | -            | - | -   | -   | 12      | -   |
| MACLEOD HARBOR   |              |   |     |     |         |     |
| Install Boat Launch Facility 1   | -            | - | X   | X   | X       | X   |
| Install Boat Launch Facility 2   | -            | - | X   | X   | X       | X   |
| Airstrip Improvement (FEASIBILITY STUDY)- non-motorized foot trail to alpine from timber sale rd. - trailhead (TH) pkg for trail to alpine from timber sale road | -            | X | 1.0 | 1.0 | 1.0     | 1.0 |
| Interpretive Site- fish project  | -            | - | X   | X   | X       | X   |
| Developed Campground   | -            | - | -   | -   | 20 unit | -   |
| MONTAGUE ISLAND PROJECTS   |              |   |     |     |         |     |
| SAN JUAN BAY   |              |   |     |     |         |     |
| Move Cabin   | -            | - | X   | X   | X       | X   |
| Tent platform, pad or shelter  | -            | - | X   | X   | shelter | X   |
| Add Food Cache to Cabin  | -            | X | X   | X   | X       | X   |
| Airstrip Improvement (FEASIBILITY STUDY)-  | -            | - | -   | -   | X       | -   |
| Install 1 Boat Launch Facility   | -            | - | X   | X   | X       | X   |
| 1/2 mile foot trail from cabin to fishing stream   |              |   | .5  | .5  | .5      | .5  |
| 1 mile alpine foot trail from NW corner San Juan Arca  |              |   | 1.0 | 1.0 | 1.0     | 1.0 |
| trailhead parking for 1 mile trail to alpine   | -            | - | X   | X   | X       | X   |
| 2 miles foot trail from SW corner of San Juan area   |              |   | 2.0 | 2.0 | 2.0     | 2.0 |
| trailhead parking  | -            | - | X   | X   | X       | X   |
| Interpretive Site-Tmbr/fisheries   | -            | - | X   | X   | X       | X   |
| Interp. Site Cultural Resources  | -            | - | -   | -   | X       | -   |

Table 2-9b

| JEANIE COVE                               | 1 | 2 | 3   | 4   | 5   | 6   |
|---|---|---|-----|-----|-----|-----|
| Install New Cabin                         | - | X | X   | X   | X   | X   |
| Add Food Cache to Cabin                   | - | X | X   | X   | X   | X   |
| Airstrip Improvement (FEASIBILITY STUDY)- | - | - | -   | -   | X   | -   |
| Non-motorized foot trail up               |   |   |     |     |     |     |
| Jeanie Creek from rec cabin               |   | - | 1.0 | 1.0 | 1.0 | 1.0 |
| Build TH pkg area (at road)               | - | - | -   | X   | X   | -   |
| Non-motorized foot trail from             |   |   |     |     |     |     |
| road in Tortuous Cr. to alpine.           | - | - | -   | 1.0 | 1.0 | -   |
| Build TH pkg area                         | - | - | -   | X   | X   | -   |
| Interpretive Site - timber                |   | - | -   | X   | X   | -   |

| STUMP LAKE  |   |     |     |     |     |     |
|---|---|-----|-----|-----|-----|-----|
| Miles of trail Rehab btwn cabins                          | - | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Add Food Cache to Cabin                                   | - | X   | X   | X   | X   | X   |
| 1/4 mile foot trail from cabin to beach                   |   | .25 | .25 | .25 | .25 | .25 |
| loop opportunity foot trail from Stump Lake to Patton Bay |   | -   | -   | 5.0 | 5.0 | 5.0 |
| foot tr from loop tr. to connect with main road           | - | -   | -   | 2.0 | 2.0 | -   |
| Trailhead parking for Stump Lake on main road             | - | -   | -   | X   | X   | X   |
| foot tr from loop tr. to connect with spur road           | - | -   | -   | -   | -   | 1.0 |
| Build TH pkg near   | - | -   | -   | -   | -   | X   |
| Inter. site Timber/Fisheries                              | - | -   | -   | -   | -   | X   |

Table 2-9c

| MONTAGUE ISLAND PROJECTS   | ALTERNATIVES |     |     |     |            |     |
|--|--------------|-----|-----|-----|------------|-----|
|  | 1            | 2   | 3   | 4   | 5          | 6   |
| NELLIE MARTIN RIVER  |              |     |     |     |            |     |
| Airstrip Improvement (FEASIBILITY STUDY)-                                      |              | X   | X   | X   | X          | X   |
| Tent platform, pad or shelter  | -            | -   | -   | 2   | 2 shelters | 2   |
| Add Food Cache to Cabin  | -            | X   | X   | X   | X          | X   |
| Rehab of non-mtrzd trail from beach landing to cabin                           |              | .25 | .25 | .25 | .25        | .25 |
| foot bridge over N.Martin Riv.   |              |     |     |     |            |     |
| for loop tr. listed under Stump  | -            | -   | -   | X   | X          | X   |
| Recreation cabins dispersed along road at Upper Reaches of Nellie Martin River | -            | -   | -   | -   | 3          | -   |
| 3 Sport fishing trails in the Upper Reaches of Nellie Martin                   |              |     |     |     |            |     |
| north sport-fishing trail  | -            | -   | -   | .25 | .25        | .25 |
| fishing trail parking  | -            | -   | -   | X   | X          | X   |
| Fishing trail  | -            | -   | -   | -   | -          | .5  |
| fishing trail parking  | -            | -   | -   | -   | -          | X   |
| fishing trail  | -            | -   | -   | -   | .25        | .25 |
| TH pkg (also ATV/Foot trail connection for alternative #5.)                    |              |     |     | -   | X          | -   |
| Inter.Site-fisheries   | -            | -   | -   | -   | -          | X   |
| BEACH RIVER  |              |     |     |     |            |     |
| Add Food Cache to Cabins   |              | X   | X   | X   | X          | X   |
| Airstrip Improvement (FEASIBILITY STUDY)                                       | -            | -   | -   | -   | X          | -   |



Table 2-9d

| NORTH MONTAGUE ISLAND PROJECTS        |   | ALTERNATIVES |   |   |   |   |  |
|---------------------------------------|---|--------------|---|---|---|---|--|
|                                       | 1 | 2            | 3 | 4 | 5 | 6 |  |
| <b>ZAIOF BAY</b>                      |   |              |   |   |   |   |  |
| Install new cabin                     | - | -            | - | - | X | - |  |
| Install anchor bouy                   |   | X            | X | X | X | X |  |
| <b>ROCKY BAY</b>                      |   |              |   |   |   |   |  |
| Install new cabin                     | - | -            | - | - | X | - |  |
| <b>PORT CHALMERS</b>                  |   |              |   |   |   |   |  |
| Add Food Cache to Cabin               |   | X            | X | X | X | X |  |
| <b>MONTAGUE LAGOON</b>                |   |              |   |   |   |   |  |
| Install new cabin (feasibility study) | - | -            | - | - | X | - |  |
| <b>GREEN ISLAND PROJECTS</b>          |   |              |   |   |   |   |  |
|                                       | 1 | 2            | 3 | 4 | 5 | 6 |  |
| Add Food Cache to Cabins              |   | X            | X | X | X | X |  |
| <b>HINCHINBROOK ISLAND PROJECTS</b>   |   |              |   |   |   |   |  |
| <b>SHELTER BAY</b>                    |   |              |   |   |   |   |  |
| Install New Cabin                     | - | X            | X | X | X | X |  |
| Add Food Cache to Cabins              | - | X            | X | X | X | X |  |
| <b>HOOK POINT</b>                     |   |              |   |   |   |   |  |
| Add Food Cache to Cabins              | - | X            | X | X | X | X |  |
| <b>DOUBLE BAY</b>                     |   |              |   |   |   |   |  |
| Add Food Cache to Cabins              | - | X            | X | X | X | X |  |

## 2 Alternatives

### **Visual Resource Issue**

Implementation of any of the action alternatives results in a decrease in the natural appearance of the landscape and an increase in the altered appearance of the landscape on South Montague. The alteration is largely due to timber harvest and road construction. The remainder of the management area would remain in a relatively unaltered condition. Alternative 1 results in no change in the visual resource as a result of National Forest management activities. Cumulative affects of actions on private land results in a major modification of the viewshed around Beach River. The change in landscape character varies directly with the amount of roading and timber harvest in the action alternatives. Alternatives 2,4,5, and 6 result in relatively the same amount of change in the natural appearance of the landscape with Alternative 3 resulting in the greatest increase.

The adopted Visual Quality Objectives would not be completely met in any of the action alternatives. Even in Alternative 1, some Visual Quality Objectives are not met due to past actions. Changes in the visual quality would be greatest in MacLeod Harbor for Alternative 2. For San Juan Bay, Alternatives 2 and 3 result in the largest amount of landscape modification. The following tables 2-10a and 2-10b compare the resource management features of the alternatives as they respond to various issues.

The following tables 2-10a and 2-10b compare the resource management features of the alternatives as they respond to various issues.

**Table 2-10a**

|                                   |                  | Alternatives |        |        |        |        |        |
|-----------------------------------|------------------|--------------|--------|--------|--------|--------|--------|
| Resource Management               | Units            |              |        |        |        |        |        |
| Feature                           |                  | 1            | 2      | 3      | 4      | 5      | 6      |
| ACCESS                            |                  |              |        |        |        |        |        |
| Arterial Road                     | Miles            | 0            | 11.6   | 11.6   | 34.5   | 34.5   | 34.8   |
| Collector Road                    | Miles            | 0            | 1.9    | 2.9    | 2.9    | 3.9    | 5.0    |
| Local Road                        | Miles            | 0            | 16.8   | 22.0   | 13.4   | 15.9   | 16.0   |
| Temporary Road                    | Miles            | 0            | 8.3    | 9.5    | 6.8    | 8.0    | 8.5    |
| Total Road                        | Miles            | 0            | 38.6   | 46.0   | 57.6   | 62.3   | 64.3   |
| Total Road Cost                   | Million Dollars  | 0.00         | 4.65   | 5.60   | 6.99   | 7.56   | 7.86   |
| Road Cost Per Mile                | Thousand Dollars | 0.00         | 120.4  | 122.3  | 121.4  | 121.0  | 122.2  |
| Road Cost Per MBF                 | Dollars          | 0            | 222    | 196    | 226    | 216    | 215    |
| Suitable Timber Volume            |                  |              |        |        |        |        |        |
| Accessed So. Montague             | %                | 0            | 18     | 26.6   | 24.6   | 30.9   | 31.4   |
| Nonmotorized Trail                | Miles            | 0            | .25    | 6.0    | 14.0   | 26.25  | 11.75  |
| Motorized Trail                   | Miles            | 0            | 0      | 0      | 0      | 7      | 0      |
| Trail Head Parking                | Number           | 0            | 0      | 3      | 6      | 7      | 7      |
| Salt Water Access                 | Number           | 0            | 0      | 3      | 3      | 3      | 3      |
| Anchor Buoys                      | Number           | 0            | 1      | 1      | 1      | 1      | 1      |
| Log Transfer Facility             |                  |              |        |        |        |        |        |
| National Forest System            | Number           | 0            | 1      | 1      | 0      | 0      | 0      |
| Private Lands                     | Number           | 2            | 2      | 2      | 1      | 1      | 1      |
| Air Strips Feasibility Studies    |                  |              |        |        |        |        |        |
|                                   | Number           | 0            | 0      | 2      | 2      | 5      | 2      |
| FISH (Montague Island)            |                  |              |        |        |        |        |        |
| Fisheries Enhancement Feasibility |                  |              |        |        |        |        |        |
|                                   | Number           | 4            | 8      | 8      | 14     | 14     | 14     |
| Fish Produced per year            | Pounds           | 0            | 201400 | 201400 | 221700 | 221700 | 221700 |
| Harvest in Priority 1             |                  |              |        |        |        |        |        |
| Stream Habitat Zones              | Acres            | 0            | 12     | 139    | 8      | 184    | 196    |
| Road in Priority 1                |                  |              |        |        |        |        |        |
| Stream Habitat Zones              | Miles            | 0            | 1      | 2      | 3      | 5      | 5      |

## 2 Alternatives

**Table 2-10b**

| Resource Management<br>Feature                              | Units    | Alternatives |        |       |       |        |       |
|---|----------|--------------|--------|-------|-------|--------|-------|
|   |          | 1            | 2      | 3     | 4     | 5      | 6     |
| Stream Crossing Prior-<br>ity 1 Stream Habitat<br>Zones     | Number   | 0            | 11     | 15    | 11    | 16     | 15    |
| <b>WILDLIFE (Montague Island)</b>                           |          |              |        |       |       |        |       |
| Decline in Deep Snow<br>Year Deer Habitat<br>Capability     | %        | 0            | 2      | 3     | 3     | 4      | 4     |
| Brown Bear CFL Riparian/<br>Beach Fringe Habitat<br>Removed | %        | 0            | 2      | 3     | 4     | 7      | 6     |
| Eagle Nests within<br>0.5 miles of road                     | Number   | 0            | 3      | 3     | 7     | 7      | 7     |
| Potential Eagle CFL<br>Nesting/Roosting Habitat<br>Removed  | %        | 0            | 2      | 2     | 1     | 1      | 1     |
| Goose CFL Habitat<br>Removed                                | %        | 0            | 2      | 2     | 3     | 4      | 3     |
| Woodpecker CFL<br>Habitat Removed                           | %        | 0            | 4      | 5     | 5     | 5      | 6     |
| Merganser CFL Habitat<br>Removed                            | %        | 0            | 1      | 5     | 6     | 11     | 10    |
| <b>TIMBER</b>   |          |              |        |       |       |        |       |
| Timber Volume   | MMBF     | 0            | 20.9   | 30.9  | 28.6  | 36.0   | 36.5  |
| Total Area Harvested  | Acres    | 0            | 777    | 1,014 | 999   | 1,151  | 1,219 |
| Timber Sale Net Value                                       | Thousand | 0            | -1,242 | -570  | 527   | 1,239  | 971   |
| <b>RECREATION</b>   |          |              |        |       |       |        |       |
| Increased Recreation<br>Use                                 | RVD      |              | 1,934  | 3,646 | 6,266 | 28,630 | 6,108 |
| Tent Platforms and<br>Shelters                              | Number   | 0            | 0      | 1     | 3     | 3      | 3     |
| New Cabins  | Number   | 0            | 2      | 2     | 2     | 8      | 2     |
| <b>VISUALS</b>  |          |              |        |       |       |        |       |
| Visual Quality Obj.<br>not met-Montague Is.                 | Acres    | 1764         | 2076   | 2174  | 2058  | 2068   | 2072  |
| Present Value   | Thousand |              |        |       |       |        |       |
| All Resources   | Dollars  | 1418         | -325   | -238  | -3    | 190    | 295   |



# **Chapter 3**

## **Affected Environment**



# BIG ISLANDS MANAGEMENT AREA



SCALE 1 : 400,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 16, 1989

**Table 3-1: Acres by Land Owner by Island for Big Islands Management Area**

| LAND OWNERSHIP STATUS          | HINCHENBROOK | HAWKINS | GREEN | MONTAGUE | TOTAL MA | % MA LAND | MMBP VOLUME |
|--------------------------------|--------------|---------|-------|----------|----------|-----------|-------------|
| TOTAL LAND BASE BIG ISLANDS MA | 110,996      | 44,256  | 7,374 | 206,871  | 369,497  | 100.0     | 1,569.124   |
| CONVEYED TO STATE              | 506          | 814     | 0     | 0        | 1,320    | 0.3       | 16.321      |
| CONVEYED TO NATIVES            | 803          | 3,204   | 0     | 15,440   | 19,447   | 5.3       | 210.147     |
| TOTAL CONVEYED                 | 1,309        | 4,018   | 0     | 15,440   | 20,767   | 5.6       | 226.468     |
| STATE SELECTIONS               | 6,168        | 222     | 0     | 1,272    | 7,662    | 2.1       | 41.594      |
| NATIVE SELECTIONS              | 1,338        | 17,975  | 0     | 0        | 19,313   | 5.2       | 145.887     |
| DUAL SELECTIONS                | 2,236        | 5,478   | 0     | 0        | 7,714    | 2.1       | 72.180      |
| TOTAL SELECTIONS               | 9,742        | 23,675  | 0     | 1,272    | 34,689   | 9.4       | 259.661     |
| TOTAL PRIVATE OWNERSHIP        | 11,051       | 27,693  | 0     | 16,712   | 55,456   | 15.0      | 486.129     |
| TOTAL NATIONAL FOREST          | 99,945       | 16,563  | 7,374 | 190,159  | 314,041  | 85.0      | 1,082.995   |



## Minerals and Geology

Lands managed by the Chugach National Forest included in the Big Island Management Area do not have a high potential for leasable, locatable, or common variety mineral deposits. The most abundant known mineral deposits include metals such as copper and manganese.

The management area is generally dominated by two major rock groups, the Valdez and the Orca (Nelson and Jansons, 1984). Both groups consist largely of graywacke, siltstone, and shale. The Orca Group generally contains rocks that are less metamorphosed than the Valdez Group and also contains mafic volcanic rocks and some beds of conglomerates. Copper in the form of chalcopyrite is the most abundant mineral found in the management area. It is associated with a prominent barite belt and with some mafic volcanic bearing rocks on the eastern portion of Hinchinbrook Island. Chalcopyrite has also been identified in quartz veins north of Jeanne Cove on Montague Island. Several occurrences of chalcopyrite have been found at the head of Whiskey Cove on Hawkins Island. There are presently six known copper occurrences on Hawkins Island and one on Hinchinbrook Island. There is also one other mineral occurrence on Hinchinbrook Island that may contain cobalt, chromium, nickel, or molybdenum.

Gold and silver occur in quartz veins located in shear planes, faults, and localized fissures in the metamorphosed sedimentary host rock of the Orca Group (Hoekzema, Fetchner, and Kurtak, 1987). All known gold deposits are small and scattered. These deposits are located in a lineal trend that extends along the eastern shore of Hinchinbrook Island into the Heney Mountains and north of Cordova.

There are no known active mining operations in the management area at this time. Exploration and development of the minerals located in this management area is expected to be minimal and small in scale. Increases in the prices for these metals, especially gold and silver, may lead to an increase in activity. Exploration is usually limited because of the harsh climate, the remoteness of the area, and the ruggedness of the terrain. The most likely area for mineral development is located on the southeast side of Hinchinbrook Island.

The management area is located in a very active (Zone 4) seismic belt which rings the Pacific Ocean. This zone has the highest potential for earthquakes large enough to do structural damage. Approximately 24 earthquakes of a Richter scale rating of greater than 5.0 have had their epicenters within 10 miles of the islands in the management area. Approximately 14 of these earthquakes occurred as after-shocks to the earthquake of March 27, 1964. Crustal movement has occurred on Montague and the other islands as a result of these earthquakes. The greatest recorded movement was from the 1964 quake which uplifted the south end of Montague Island 38 feet. The center, mountainous portion of the island also rose significantly compared to the lower elevations on the southeast side of the island.

## Access Management

There are no Federal, State or Forest roads existing within the boundaries of the Big Islands Management Area. There is a low standard 0.5-mile road on private land on the north side of MacLeod Harbor of Montague Island. There are no roads on Hinchinbrook, Hawkins, The Needle, Wooded, Little Green and Green Islands.

Present access to the four islands is by boat or small aircraft. There are no public landing facilities for aircraft. However, some wheeled aircraft use undeveloped beaches during low tides and/or ridges clear of obstructions and large vegetation. Stump Lake on Montague Island is the only lake used by float planes; they also use a limited number of salt-water coves and bays. Boaters use anchorages and certain beaches for landing, based on local knowledge.

Four trail and site easements across private land for public use are held by the Forest Service in the Patton Bay area on Montague Island.

There are no existing log transfer facilities in the management area.

## Wildlife and Fish

The Big Islands Management Area provides important habitat for a variety of wildlife and fish species. The diverse habitats present are a combination of many interrelated factors which provide species populations with the basic food and cover requirements needed for breeding, nesting, spawning, rearing young, resting, escaping and feeding. Wildlife and fish populations fluctuate with weather conditions and as the habitat becomes more or less favorable for the species.

Vegetation in the Big Islands Management Area, especially mature forests, provides important habitat for brown bears, bald eagles, and the largest segment of the Prince William Sound Sitka black-tailed deer population. Numerous other wildlife species including mink, otter, woodpeckers, geese, ducks, shorebirds, song birds, and a variety of small mammals rely on specific characteristics of the existing vegetation communities.

The freshwater streams and lakes in the Big Islands Management Area are important in providing spawning and rearing habitat for pink, chum, coho and sockeye salmon, cutthroat trout and Dolly Varden char. The shallow, near shore marine environments provide spawning areas for herring and rearing areas for juvenile salmon, herring, and shellfish.

### Management Indicator Species

The Forest Service manages habitat for all wildlife and fish species on National Forest lands. However, most species can be grouped according to habitat requirements. Ten wildlife and fish species occupying the Big Islands Management Area have been classified as Management Indicator Species (Table 3-2). Management Indicator Species are species whose population changes are believed to indicate the effects of land management activities and collectively represent the complexity of habitats, species



and associated management concerns. Species were selected that represent the habitats most likely to be affected by management actions with emphasis on those species commonly hunted and fished. Monitoring the health and populations of Management Indicator Species provides estimates of the relative well-being of the groups of animals they represent (Sidle and Suring 1986).

The Montague vole, a Threatened or Endangered category II candidate species, was also selected as a management indicator species.

Table 3-2 Management Indicator Species and Representative Habitat

| <u>Species</u>                        | <u>Habitat</u>                               |
|---------------------------------------|--|
| Sitka Black-tailed Deer               | Mature Forest                                |
| Brown Bear                            |  |
| Bald Eagle                            |  |
| Woodpeckers (Piciformes)              | Special Habitats (Snags, Wetlands, Riparian) |
| Common Merganser                      |  |
| Canada Goose                          |  |
| Pink Salmon                           | Fresh Water Aquatic and Riparian             |
| Cutthroat Trout                       |  |
| Coho Salmon                           |  |
| Montague Vole (Candidate T&E Species) | Dry Muskeg and Uplifted Beach                |

## **Wildlife**

### **Mature Forest Habitats**

Deer are present on all islands in the Big Islands Management Area. Dieoffs due to extreme winter snow depths, snow duration and limited winter habitat have periodically reduced deer populations in the Big Islands Management Area (Reynolds 1979). Current population estimates do not exist, but numbers are considered to be high as no major dieoffs have occurred in the last 16 years. Mature forests with a well-developed canopy and available understory forage provide essential winter range. Stands in areas with relatively low winter snow depths near the coastline are the most important winter habitats (Maps C and D), although higher elevation stands on south slopes are also valuable. Approximately 2000 acres of winter range habitats have been modified through past timber management activities on the inside of Montague Island adjacent to Montague Strait.

Montague and Hinchinbrook Islands support the major island populations of brown bear in Prince William Sound. Brown bear are not as common on Hawkins Island. Major concentration areas (ADF&G 1973) are depicted in maps C and D. Upland and beach fringe forests, along with avalanche chutes and selected alpine habitats, provide for most of the year-round needs of brown bear. The most important habitats are salmon streams and the associated forest cover. Brown bear habitat is generally considered excellent due to spatial arrangement of necessary habitats. The reduction in salmon production as a result of the 1964 earthquake and the associated uplift has changed the availability and species mix of this valuable food source, with unknown effects on brown bear populations.

Bald eagles are common along forested coastal areas throughout the Big Islands Management Area. Mature trees in the beach fringe forests near anadromous fish streams offer the best combinations of food and rearing conditions. Maps C and D illustrate the known distribution (other nests undoubtedly exist) of active and inactive eagle nests in the Big Islands Management Area.

### **Special Habitats**

Woodpeckers represent the variety of species that use snags and partially dead trees for foraging and nesting. Mature forest generally provides the necessary snags and other suitable habitat conditions. Although woodpeckers are seldom observed on the Big Islands, snags do not appear to be a limiting factor for woodpeckers or other cavity-nesting birds. Timber stand exam data available from south Montague Island indicates that there are approximately 970 snags averaging 24 inches in diameter per 100 acres in unmanaged forest stands.

Riparian and wetland habitats are critical habitats for numerous wildlife species represented by the common merganser and Canada goose.

Mature forests provide the necessary components for nesting and brood rearing for the common merganser (Wood 1986, White 1957). Especially important are snags with cavities for nesting which are adjacent to clear water streams with significant production of juvenile salmonoids. Population estimates for common mergansers within the management area are not available.

Prince William Sound Canada geese utilize upland muskeg pond habitats and adjacent mature forests for nesting and brood rearing. Estuaries and bays are important staging and loafing areas. However, little information is available on abundance, distribution or life history. Research currently in progress is directed at determining the genetic characteristics of the Prince William Sound Canada geese.

### **Habitats Not Represented by Management Indicator Species**

The amount of early and secondary forest communities and their associated wildlife species are currently limited in the Big Islands Management Area. Approximately 2000 acres of timber have been harvested on Montague Island in the last 40 years. Fire, which would create early successional communities, are uncommon. No early succession Management Indicator Species was determined to be necessary, because these communities would increase with proposed Forest Service and private actions.

Alpine habitats are well dispersed throughout the Management Area. No vegetation management actions are scheduled and therefore these habitats are not represented by an indicator species.

### **Hunting and Trapping**

Of the approximately 2000 deer harvested each year in Game Management Unit 6, 45% are taken from Montague Island. Hawkins and Hinchinbrook Islands account for another 30% of the yearly Unit 6 harvest. Table 3-3 shows the estimated 1987 harvest and days hunted for Unit 6 subunits (Map 2) within the Big Islands Management Area. Approximately 19% of the 1987 Unit 6 harvest and 24% of the days hunted occurred in



subunits 35, 36 and 37 on south Montague Island. Only about 5% of the hunters in Unit 6 are non-Alaskans. During the 1987-88 hunting season, an estimated 1906 hunters spent approximately \$1,250,000 to hunt deer in Unit 6 (Griese and Becker 1988).

Table 3-3 Estimates for Sitka black-tailed deer harvested and days hunted per subunit in Game Management Unit 6, Alaska, 1987.\*

| Island       | Subunit | Deer Kill | Days Hunted |
|--------------|---------|-----------|-------------|
| Montague     | 33      | 443       | 1019        |
|              | 34      | 27        | 99          |
|              | 35      | 129       | 870         |
|              | 36      | 101       | 260         |
|              | 37      | 267       | 1118        |
|              | 38      | 27        | 46          |
| Hawkins      | 43      | 250       | 640         |
|              | 44      | 210       | 666         |
| Hinchinbrook | 39      | 122       | 264         |
|              | 40      | 112       | 119         |
|              | 41      | 196       | 580         |
|              | 42      | 129       | 406         |
| Green        | 32      | 34        | 224         |
| Other Areas  |         | 622       | 3049        |
| Total        |         | 2669      | 9360        |

\*(Griese and Becker 1988)

Brown bear hunting occurs on Hinchinbrook and Montague Islands, where approximately 50% of the hunters are non-residents (Culbertson 1979, Bucaria 1979). Of the 39 brown bears harvested in ADF&G Game Management Unit 6 (Prince William Sound) in 1985, 5 were taken from Hinchinbrook and 3 from Montague (Townsend, 1986).

Trapping pressure is light in the Big Islands area because of relatively low numbers of furbearers and limited accessibility. Most trapping of mink and otter occurs during winter months.

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Trapping pressure is light in the Big Islands area because of relatively low numbers of furbearers and limited accessibility. Most trapping of mink and otter occurs during winter months.

## **Threatened and Endangered Species**

No known listed or proposed threatened or endangered species is present on National Forest lands within the Big Islands Management Area, although humpback and gray whales are present in adjacent waters.

The U.S. Fish and Wildlife Service has identified the Montague vole as a category 2 candidate threatened or endangered species. This classification lists species where insufficient genetic information exists. Surveys were initiated in 1987 to document genetic variation, habitat use, and distribution.

## **Fish**

### **Fresh Water Aquatic and Riparian Habitats**

Pink salmon, coho salmon and cutthroat trout are the Management Indicator species representative of the fish species utilizing aquatic habitats within the Big Islands Management Area. The Alaska Department of Fish and Game has designated 142 streams within the management area as anadromous fish streams. These streams, along with streams likely supporting anadromous species, contain approximately 405 miles of stream habitat and 563 acres of lakes accessible to anadromous fish (Maps A and B). Many streams and lakes which are not accessible to anadromous fish support resident fish populations.

Pink salmon are the most abundant salmon species in Alaska and in the Big Island Management Area. Their populations are cyclic by nature and vary greatly over time and between even and odd year runs. Critical spawning habitats are provided by the clean and well-sorted gravels within the lower reaches of main stem and principal tributary streams and the upper intertidal zones of major stream channels. Newly emergent pink salmon juveniles migrate immediately to the estuarine environment to begin their rearing and growth.

Coho salmon are generally widely distributed throughout the streams in the Big Islands Management Area. Coho spend the first two years of their life cycle as juveniles residing in small streams, lakes, beaver ponds and slough areas. These habitats are closely associated with forested and riparian environments where the type and quality of stream rearing habitats limit natural fish production. Critical habitat features are closely related to the abundance and diversity of stream channels, pools and streamside vegetation. Both the abundance and long-term availability of large organic debris are important factors in maintaining the productivity of coho rearing habitats.

Both anadromous and resident forms of cutthroat trout are present in Big Island streams and lakes. Habitat requirements for anadromous cutthroat are similar to those for coho salmon, although their life cycle is somewhat different.



Resident cutthroat are closely dependent on lake environments for feeding and overwintering, while stream habitats are used for spawning and summer rearing. Little is known regarding the abundance and distribution of cutthroat trout in streams and lakes within the Big Islands Management Area.

### **Fishing**

The Forest Service's Big Islands Management Area encompasses the Alaska Department of Fish and Game's Southeastern and Montague fishing districts of the Prince William Sound Fisheries Management Area. The commercial salmon fishery in these districts is primarily for pink salmon with chum salmon being a secondary species in the Southeast district. Significant harvests of chum salmon have not occurred in the Montague district since 1973. Coho and sockeye salmon stocks are not managed for commercial harvest but are taken incidental to other fisheries.

Prince William Sound, including the Big Islands Management Area, is noted for its commercial and sport fisheries for salmon, herring, halibut, bottomfish, crab and shrimp. In 1987, 1,067,000 pink salmon and 35,000 chum salmon were harvested from waters adjacent to the Big Islands Management Area. The total estimated commercial value was \$1,281,951, or about 3% of the entire PWS salmon fishery. This figure should be considered a minimum value since some of the catches may have been delivered to tenders in other districts. The commercial catches and the relative proportions of the catch in the different districts also vary from year to year depending on the strength of the runs, the timing of the fishing period openings, and the distribution of fishing effort. Interception of fish bound for other spawning areas is unknown but is assumed to be minimal for this area. Most of the pink and chum salmon caught appear to be wild stocks originating from streams within the management area. Approximately 82-88% of the wild stock pink salmon and 97.5% of the wild stock chum salmon which are produced within the management area are produced on the National Forest.

Streams and lakes in the management area and the adjacent saltwater areas support a substantial recreational fishery. Pink salmon, coho salmon and halibut are the most sought after species in saltwater. Coho salmon, Dolly Varden char and cutthroat trout are the primary freshwater gamefish. Several stream systems in the planning area are well known for their sport fisheries; the most popular areas include the Nellie Martin River, San Juan Bay, Shelter Bay, and Makaka Creek. Other popular sport fisheries areas are associated with Forest recreation cabins. The magnitude of the sport fish harvest in the management area and the economic values are unknown.

### **Fisheries Enhancement**

Fish habitat in the Big Islands area was significantly impacted by the uplift associated with the 1964 earthquake. Many productive intertidal spawning areas were destroyed and major stream channel destabilization was widespread. These changes reduced habitat capability and caused severe declines in the naturally occurring salmon runs. The reduction in chum salmon populations on Montague Island was primarily related to these impacts.

National Forest fish habitat enhancement activities within the Big Islands area have largely been attempts to mitigate the effects of the 1964 earthquake (Table 3-4). Numerous stream channel stabilization projects were completed in the late 1960s and early 1970s. Most of these efforts were effective for only a short period because of the extreme channel instability caused by the earthquake. Recent channel stabilization projects have been more successful, but extreme flow fluctuations and inherent channel instability still limit the project life in most cases.

Three fish passes have been constructed at barrier falls to allow salmon to access the upstream habitat. The Forest Service is also cooperating with the Alaska Department of Fish and Game and the Prince William Sound Aquaculture Corporation to reintroduce chum salmon to Montague Island on an experimental basis.

Table 3-4 Fisheries Habitat Improvement Projects Completed on National Forest Lands within the Big Islands Management Area.

| Stream # | Stream Name     | Year | Project Type                   |
|----------|-----------------|------|--------------------------------|
| 17070    | MacLeod Cr.     | 1972 | Channelization                 |
| 17100    | Hanning Cr.     | 1973 | Debris Removal                 |
| 17380    | Russell Cr.     | 1971 | Log Removal                    |
| 17380    | Russell Cr.     | 1972 | Log Removal                    |
| 17440    | Wilby Cr.       | 1967 | Log and Gravel Revetment       |
| 17440    | Wilby Cr.       | 1968 | Rock Barrier Removal           |
| 17450    | Wild Cr.        | 1967 | Log and Gravel Revetment       |
| 17450    | Wild Cr.        | 1968 | Channel Stabilization          |
| 17490    | Shad Cr.        | 1967 | Log Removal and Channelization |
| 17490    | Shad Cr.        | 1968 | Log Removal                    |
| 17590    | Rocky Cr.       | 1983 | Steeppass                      |
| 17700    | Udall Cr.       | 1967 | Log Removal                    |
| 17700    | Udall Cr.       | 1986 | Debris Dam Removal             |
| 17750    | Pautzke Cr.     | 1967 | Channel through Berm           |
| 18100    | Garden Cove Cr. | 1970 | Log Removal and Channelization |
| 18110    | Etches Cr.      | 1969 | Log Removal                    |
| 18110    | Etches Cr.      | 1970 | Debris Removal                 |
| 18120    | Nuchek Cr.      | 1969 | Channelization                 |



|       |                 |      |                              |
|-------|-----------------|------|------------------------------|
| 18120 | Nuchek Cr.      | 1970 | Channelization and Revetment |
| 18150 | Constantine Cr. | 1967 | Deflector                    |
| 18150 | Constantine Cr. | 1968 | Deflector and Log Removal    |
| 18150 | Constantine Cr. | 1969 | Deflector                    |
| 18150 | Constantine Cr. | 1970 | Log Removal and Revetment    |
| 18150 | Constantine Cr. | 1971 | Channelization               |
| 18150 | Constantine Cr. | 1984 | Channel Stabilization        |
| 18280 | Cook Cr.        | 1968 | Log Removal                  |
| 18310 | Double Cr.      | 1968 | Log Removal                  |
| 18410 | Boswell Cr.     | 1981 | Steeppass                    |
| 18410 | Boswell Cr.     | 1982 | Steeppass Reconstruction     |
| 18470 | Hawkins Cr.     | 1967 | Channel Stabilization        |
| 18470 | Hawkins Cr.     | 1968 | Log Removal                  |
| 18470 | Hawkins Cr.     | 1969 | Stream Grading               |
| 18470 | Hawkins Cr.     | 1984 | Instream Spawning Channel    |
| 18500 | Canoe Cr.       | 1969 | Stream Widening              |
| 18520 | Trail Cr.       | 1980 | Steeppass                    |

## Vegetation

Existing vegetation for Montague Island is displayed on Maps E and F. Although no vegetative management activities are planned for Green Island during the planning period, Map G displays existing vegetation and the area proposed for a natural research area. Hawkins and Hinchinbrook Islands are not displayed since no vegetative management activities are proposed for these islands during the planning period.

The predominant vegetation from the beach to 1,000 feet in elevation consists of muskeg vegetation intermingled with forested stands ranging from 5 to 400 acres in size. In forested stands, commercial tree species include western and mountain hemlock, Sitka spruce, and black cottonwood. Understory vegetation consists of shrubs such as blueberry, salmonberry, rusty menziesia, and devil's club. The forest floor is composed of a dense mat of mosses and liverworts and plants such as golden thread, laceflower, dwarf dogwood, and skunk cabbage. Sitka spruce exists in pure stands on Montague Island. Alder is often found along beaches, streams, snow avalanche slopes, and landslides. Alder is a noncommercial species.

Steeper slopes in the 1,000 to 2,500 foot elevation range are generally covered with alder and noncommercial stands of mountain hemlock. Above 2,500 feet, alpine meadows predominate.

There are no known threatened, endangered, or sensitive plants within the Big Islands Management Area.

## **Commercial Forest Land**

The total land base in the management area consists of 369,497 acres of which 314,041 acres (eighty-five percent) is national forest. The remaining fifteen percent (55,456 acres) is or will be in private or State ownership assuming all currently selected lands are eventually conveyed (see Table: 3-1 under Lands).

Table 3-5 displays the Montague and Green Island acreage by land class that is visually displayed on Maps E, F and G. In the management area, approximately seventeen percent (52,764 acres) of National Forest land is classified as commercial forest land (CFL).

As displayed in table 3-6, National Forest CFL consists of hemlock-Sitka spruce (43 %), Sitka spruce (29 %), and hemlock (28 %) stands containing approximately 1,083 million board feet (mmbf) of sawtimber.

As displayed in table 3-7, ninety-five percent of National Forest CFL stands in the management area are classified as mature to over-mature. These stands are generally well past the age of maturity as evidenced by declining growth rates and signs of over maturity such as dead and dying trees, snags, and down woody material. They are usually characterized by large diameter trees, multi-layered canopies, a range of tree diameter sizes, and the presence of understory vegetation. Net stand volumes average 21 thousand board feet per acre and range from 8 to 40 thousand board feet per acre.

The remaining five percent of National Forest CFL supports even-aged stands of second growth hemlock-Sitka spruce which resulted from previous timber harvests dating back to 1947 or occurred as a result of the 1964 earthquake uplifting. These stands contain trees of nearly uniform age and size with few dead and dying trees and less dead and down woody material than in mature stands.

## **Commercial Forest Land Suitable for Timber Production**

Table 3-8 displays the Montague and Green Island acreage of suitable commercial forest land that is visually displayed on Maps E, F and G. In the management area, thirty-four percent of National Forest CFL (17,897 acres) is classified as suitable for timber production. This is seven percent (1,341 acres) less than the 19,238 acres of suitable forest land identified in the Chugach Land Management Plan for the Big Islands Management Area because of updated information.

**Table 3-5: Chugach National Forest Acres by Land Class and Island**

| Land Class        | Hinchinbrook | Hawkins | Green | Montague | Total<br>NF Land<br>in BIMA | Percent<br>of total<br>NF Land |
|-------------------|--------------|---------|-------|----------|-----------------------------|--------------------------------|
|                   |              |         |       |          |                             |                                |
| Water             | 1,317        | 561     | 284   | 1,424    | 3,586                       | 1 %                            |
| Nonforest land    | 29,908       | 2,125   | 1,528 | 99,644   | 131,205                     | 42 %                           |
| Forest land       | 70,720       | 13,877  | 5,562 | 89,091   | 179,250                     | 57 %                           |
| -Unproductive     | 47,773       | 10,110  | 3,676 | 64,927   | 126,486                     | 40 %                           |
| -Commercial (CPL) | 22,947       | 3,767   | 1,886 | 24,164   | 52,764                      | 17 %                           |
| Total NF Lands    | 99,945       | 16,563  | 7,374 | 190,159  | 314,041                     | 100 %                          |

**Table 3-6: Acres of National Forest CFL by Forest Type and Island**

| Forest Type          | Hinchin- |         |       |          | Total<br>NF<br>CPL | Percent<br>of Total<br>NF CPL | Total<br>Volume<br>(mmbf) |
|----------------------|----------|---------|-------|----------|--------------------|-------------------------------|---------------------------|
|                      | brook    | Hawkins | Green | Montague |                    |                               |                           |
| Hemlock              | 10,282   | 2,774   | 112   | 1,489    | 14,657             | 28 %                          | 247                       |
| Sitka Spruce         | 2,581    | 58      | 380   | 12,439   | 15,458             | 29 %                          | 405                       |
| Hemlock-Sitka spruce | 10,084   | 935     | 1,394 | 10,191   | 22,604             | 43 %                          | 431                       |
| Cottonwood           | 0        | 0       | 0     | 45       | 45                 | - %                           | -                         |
| Total                | 22,947   | 3,767   | 1,886 | 24,164   | 52,764             | 100 %                         | 1,083                     |

**Table 3-7: Acres of National Forest CFL by Size Class and Island**

| Size Class         | Hinchin- |         |       |          | Total<br>NF<br>CFL | Percent<br>of Total<br>NF CFL | Total<br>Volume<br>(mmbf) |
|--------------------|----------|---------|-------|----------|--------------------|-------------------------------|---------------------------|
|                    | brook    | Hawkins | Green | Montague |                    |                               |                           |
| Seedling/Sapling   | 59       | 0       | 0     | 2,053    | 2,112              | 4 %                           | 0                         |
| Poletimber         | 95       | 0       | 0     | 40       | 135                | 0 %                           | 2                         |
| Immature Sawtimber | 8        | 16      | 0     | 606      | 630                | 1 %                           | 13                        |
| Mature-Overmature  |          |         |       |          |                    |                               |                           |
| Sawtimber          | 22,785   | 3,751   | 1,886 | 21,465   | 49,886             | 95 %                          | 1,068                     |
| Total              | 22,947   | 3,767   | 1,886 | 24,164   | 52,764             | 100 %                         | 1,083                     |



**Table 3-8: Acres of National Forest CFL Suitable for Timber Management by Suitability Class and Island**

| Land Suitability        | Hinchinbrook | Hawkins | Green | Montague | Total<br>NP<br>CFL | Percent<br>of Total<br>NP CFL |
|-------------------------|--------------|---------|-------|----------|--------------------|-------------------------------|
|                         |              |         |       |          |                    |                               |
| -Commercial Forest Land | 22,947       | 3,767   | 1,886 | 24,164   | 52,764             | 100 %                         |
| Unsuitable due to:      |              |         |       |          |                    |                               |
| *Unstable soils         | 332\3        | 0       | 0     | 2,794    | 3,126              | 7 %                           |
| *Slopes > 75 %          | 5,678\3      | 321     | 27    | 3,668    | 9,694              | 19 %                          |
| *Wildlife Habitat       | 0            | 0       | 0     | 964      | 964                | 2 %                           |
| *Fish Habitat           | 286\3        |         | 16    | 406      | 708                | 2 %                           |
| *Long-term economics    | 1,637\3      | 322     | 64    | 2,382    | 4,405              | 9 %                           |
| *Proposed RNA \1        | 0            | 0       | 956   | 0        | 956                | 2 %                           |
| *Primitive ROS \2       | 15,014       | 0       | 0     | 0        | 15,014             | 23 %                          |
| Total Unsuitable CFL    | 22,947       | 643     | 1,063 | 10,214   | 34,867             | 64 %                          |
| Total Suitable CFL      | 0            | 3,124   | 823   | 13,950   | 17,897             | 36 %                          |

**Table 3-9: Net Sawtimber Volume in Millions of Board Feet (mmbf) on National Forest Suitable CFL by Forest Type and Island**

| Forest Type          | Hinchin- |         |       |          | Total<br>NP SPL<br>mmbf | Percent of<br>Total mmbf<br>on NP SPL |
|----------------------|----------|---------|-------|----------|-------------------------|---------------------------------------|
|                      | brook    | Hawkins | Green | Montague |                         |                                       |
| Hemlock              | 0        | 37.2    | 0     | 25.2     | 62.4                    | 16 %                                  |
| Sitka Spruce         | 0        | 1.1     | 2.4   | 215.7    | 219.2                   | 55 %                                  |
| Hemlock-Sitka spruce | 0        | 15.7    | 17.1  | 80.9     | 113.7                   | 29 %                                  |
| Cottonwood           | 0        | 0       | 0     | 0.1      | 0.1                     | - %                                   |
| Total                | 0        | 54.0    | 19.5  | 321.9    | 395.4                   | 100 %                                 |

\* These lands are classified as unsuitable for timber management for the reason indicated.

\1 Proposed Research Natural Area on Green Island. Total area proposed for the RNA is 2,552 acres of which 956 acres is classified as commercial forest land.

\2 As per the amended Forest Plan, Hinchinbrook Island is to be managed under a Primitive ROS designation for the planning period. This designation makes all commercial forest land on the island unsuitable for timber management during the planning period.

\3 Although these acres are already unsuitable due to \2, these acres on Hinchinbrook would still be unsuitable for the reason specified.



For the management area, the National Forest suitable land base (17,897 acres) currently contains an estimated net sawtimber volume of 395.4 million board feet (mmbf). Of the total suitable acreage, seventy-eight percent is located on Montague Island, seventeen percent on Hawkins Island, and five percent on Green Island. The net sawtimber volume on suitable CFL is displayed by forest type and island in Table 3-9.

## Recreation

The Big Island area of Prince William Sound is generally undeveloped and supports a variety of recreation activities. Fish and wildlife resources attract both consumptive and nonconsumptive users to many different areas. Solitude and scenery are also major attractions. Recreational boating is a major use of the Sound and includes power boating, sailing, and sea kayaking. Other recreation activities include: sightseeing, cabin use, beach combing, clamming, and nature study.

The commercial fishing fleet also makes use of this area before and after fishing seasons. In addition to the use of the area as anchorages, it is also used for hunting and fishing.

Recreation use for the Big Islands management area was estimated at 25,000 recreation visitor days (RVDs) in 1986 including 5,800 in developed sites (recreation cabins) and 19,200 in dispersed areas. This compares with an estimated 14,800 RVDs shown in the 1984 Forest Plan (based on 1981 RIM data.) This 59% increase in RVD's is due to both actual increases in use and improvements in the data collection process.

The Big Islands management area offers recreation opportunities from developed to very primitive. Opportunities in the more developed end of the recreation spectrum are available at the edges of the management area near Cordova. The vast majority of the area is capable of providing primitive and semi-primitive recreation opportunities. Most of the National Forest land in the management area is inventoried as Primitive to Semi-Primitive. The Patton Bay area on Montague receives more use and is inventoried Semi-primitive Motorized. The area around the lodges at MacLeod Harbor and Constantine Harbor are inventoried as rural due to more development. Several timber sale areas on the inside beach of Montague Island are inventoried as Roaded Modified. Table 3-10 shows acreage for each Recreation Opportunity Spectrum (ROS) class.

Table 3-10 Acreage in the Big Islands Management Area by ROS class (Maps 13-17)

|                              |         |
|------------------------------|---------|
| Pristine (Formerly P I)      | 194,129 |
| Primitive(Formerly P II)     | 32,968  |
| Semi-Primitive Non-Motorized | 90,430  |
| Semi-Primitive Motorized     | 21,752  |
| Roaded Modified              | 9,748   |
| Roaded Natural               | 529     |
| Rural                        | 529     |

There are 9 public recreation cabins in the Big Island management area, with a total capacity for 53 people at one time. All of the current Forest Service cabins receive moderate to heavy use relative to other cabins on the Forest. In the past three years, several South Montague cabins had more requests for reservations than there were nights available. This translates into an unfulfilled demand which was most apparent for the cabins on Montague Island. With the changes in land ownership, cabin locations with popular recreation attributes are quite limited.

There are currently no Forest Service anchor buoys or tent platforms in the management area. The Forest Plan provides for the evaluation of three anchor buoys and/or tent platforms in the management area.

Since there are no roads and only a few trails in the management area, the primary means of access is by boat and aircraft. Beach landings are the only access to the "outside" portions of Hinchinbrook and Montague Islands with the exception of floatplane access at Stump Lake. Some wheel plane and floatplane access exists on the "inside" waters and beaches. Boats provide the other primary form of access to the area; however, safe small boat anchorages are limited.

The Forest Plan provides for the evaluation of at least four marine recreation system units in the management area. The intent of these areas is to maintain recreation settings that are capable of providing a variety of recreation opportunities. Facilities could be provided but the emphasis would be on maintaining natural appearing recreation settings.

There are currently no limits on the number of special use permits or types of operations for the Big Island area. In 1986, seven outfitter/guides were operating under Forest Service permit. They provided services that included guided hunting and fishing, and drop-off service with a temporary camp. There was only one permit for a temporary camp which was located at Shelter Bay. However, several operators have expressed interest in increasing the number of temporary camps, especially tents and tentframes.

There are also a number of private sector recreation operations that do not require a permit from the Forest Service at this time, but depend heavily on the management area for economic stability. A 1987 sampling of 10 air taxi and charter boat operators reported taking approximately 2,000 passengers to the management area. Deer hunting on Montague Island was the most frequently mentioned destination with the highest number of passengers (875 of the 2,000).

The MacLeod Harbor Lodge is the only concessionaire operation in the management area, although interest has been expressed in developing lodges at other locations including floating lodges.

Forest off-road vehicle (ORV) zoning was implemented in 1975 to meet the needs and diverse interests of motorized and non-motorized recreation visitors. The entire Prince William Sound area was left open to motorized use during this planning process. While



Forest vegetation, terrain, and lack of access all tend to limit use of ORVs, a limited amount of use is taking place.

Currently there is no length of stay restriction for this management area except for use of the recreation cabins. Some long term camping does occur, which can preclude other recreation uses or result in adverse resource impacts.

## Visual Resources

The Big Island Management Area is composed of a diverse range of scenic landscapes that are generally natural in their overall appearance. The current status of these landscapes will be described according to the various parameters defined by the USDA-Forest Service Visual Management System. This system is described in detail in a series of Agricultural Handbooks entitled National Forest Landscape Management and in the Forest Service Manual 2300, chapter 80.

Two primary inventories are used to measure the existing situation and to provide baselines against which the effects of each alternative can be evaluated. Those baselines are the adopted visual quality objectives (VQO's) and the existing visual condition (EVC). The process described in Volume 2, Chapter 1 of the National Forest Landscape Management series was used to inventory the VQO's. This process combines three parameters; Variety Class, Sensitivity Level and Distance Zone, in the synthesis of the inventoried VQO's.

### Variety Class

Three variety classes measure the level of inherent scenic quality in the landscape. Those levels would not be changed by proposed management activities. The distribution of lands by Variety Class is shown in Figure 3-1.

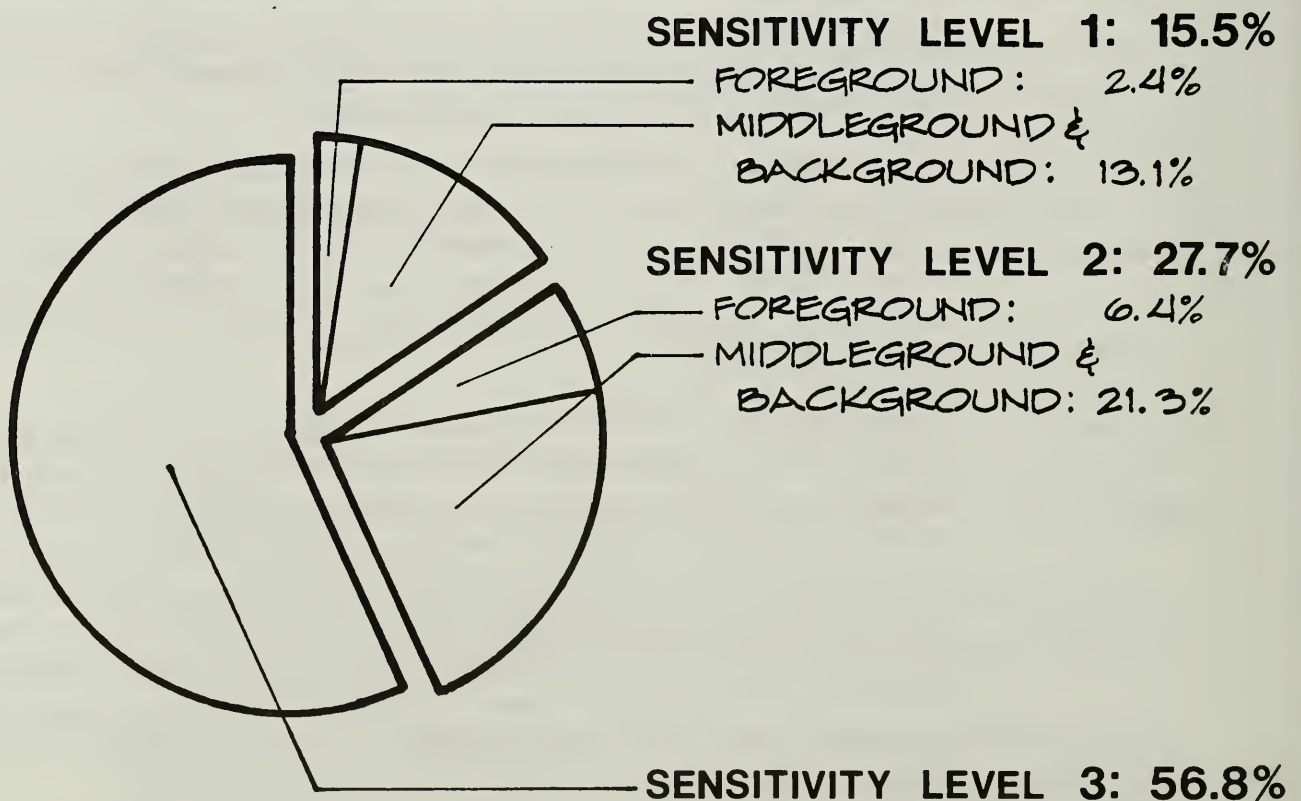
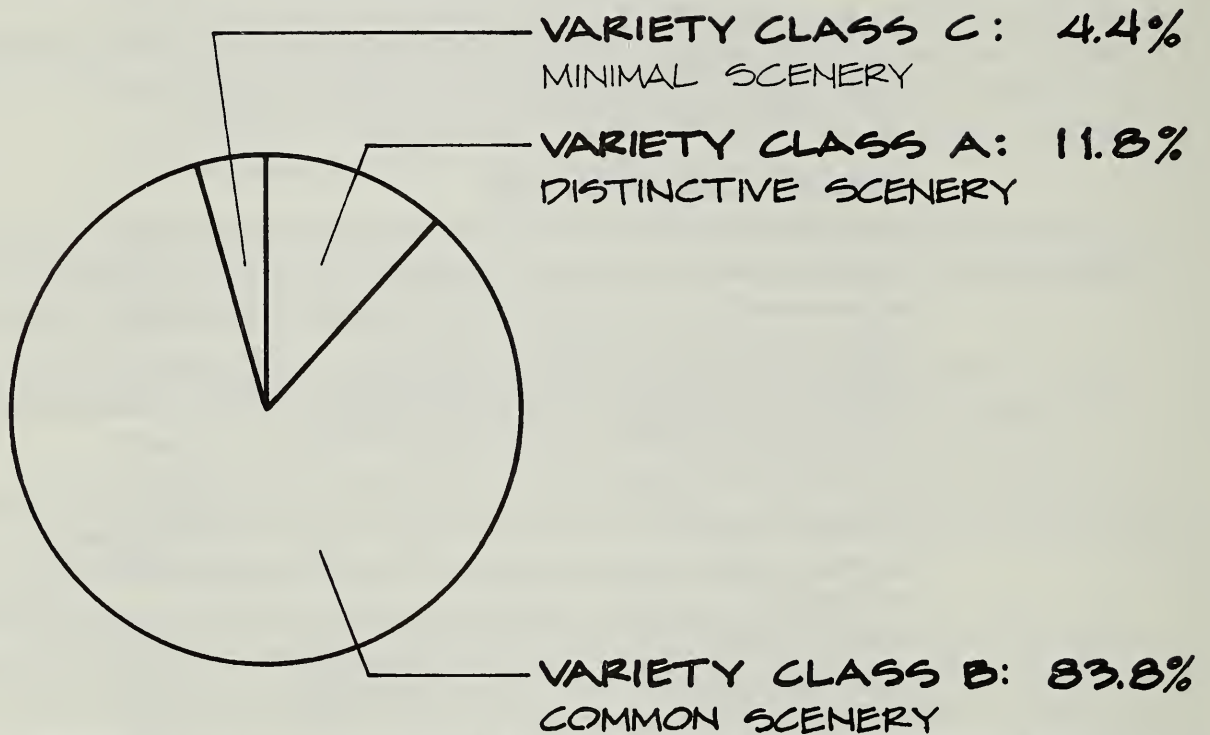
The management area is characterized by irregular coastlines, steep U-shaped valleys, glaciers and other evidence of current and past glaciation. Saltwater is a strong unifying factor, both as a means of access and as a foreground feature in characteristic views of the area. Snowy, glaciated alpine backdrops are also typical of Prince William Sound views. Vegetation between the water and the ridges exhibit diversity in patterns, textures and species.

On the Big Islands, coastlines vary from sandy beaches, such as the one at Patton Bay, to steep, rocky cliffs common to much of the Gulf of Alaska side of Montague Island. While the ridgelines down the center of both Montague and Hinchinbrook have examples of the glaciated and snow-covered terrain common to the northern mainland of the Sound, large, relatively flat areas are more prevalent in the Big Islands than in the mainland. The muskeg and tundra pond complexes at the north end of Montague Island and over much of Green Island add to the islands' diversity and differentiate them from much of the rest of the Sound. Broad and relatively lengthy valleys like the Nellie Martin drainage also serve to distinguish the islands from the remainder of the Sound.

The most scenic landscapes tend to be the high alpine ridges and glaciers, the more varied and undulating coastal areas and, to a lesser degree, steep U-shaped valleys.

Figure 3-1

## VARIETY CLASSES



## SENSITIVITY LEVELS & DISTANCE ZONES

Figure 3-2



### **Sensitivity Levels and Distance Zones**

The other two criteria that go into the formulation of the VQO inventory are Sensitivity Levels and Distance Zones. Three sensitivity levels are inventoried for the management area:

- Level 1: High sensitivity
- Level 2: Medium sensitivity
- Level 3: Low sensitivity

Distance zones are divided into foreground, middleground and background. Sensitivity levels and distance zone criteria combine to give an indication of the overall social significance of forest landscapes. The distribution of lands among the sensitivity levels and distance zone combinations is shown in Figure 3-2 and Maps 8-12

Given their saltwater surroundings, access to and initial views of the islands are from boats or small planes. Once on the islands, use tends to be focused around the recreation cabins. Thus landscapes seen from the cabins are highly sensitive. Small boat anchorages not associated with cabins, eg. Port Chalmers, Rocky Bay, and Zaikof Bay, are also landscapes that are commonly viewed and are therefore moderately sensitive. Sport fishing areas like the Nellie Martin River and Shelter Bay are also often seen by the recreating public. The central coast of Montague Island, from MacLeod Harbor to north of Hanning Bay, is a sensitivity level 1 middleground based on high sensitivity viewpoints across Montague Strait. Currently, no visually sensitive roads and few trails are present in the area. None of the area is subject to the intense level of visitation and visual scrutiny associated with the heavily used transportation corridors or developed recreation sites located on the Kenai Peninsula portion of the Forest.

Figure 3-5 illustrates the different degrees of human alterations acceptable under each VQO.

### **Existing Visual Condition**

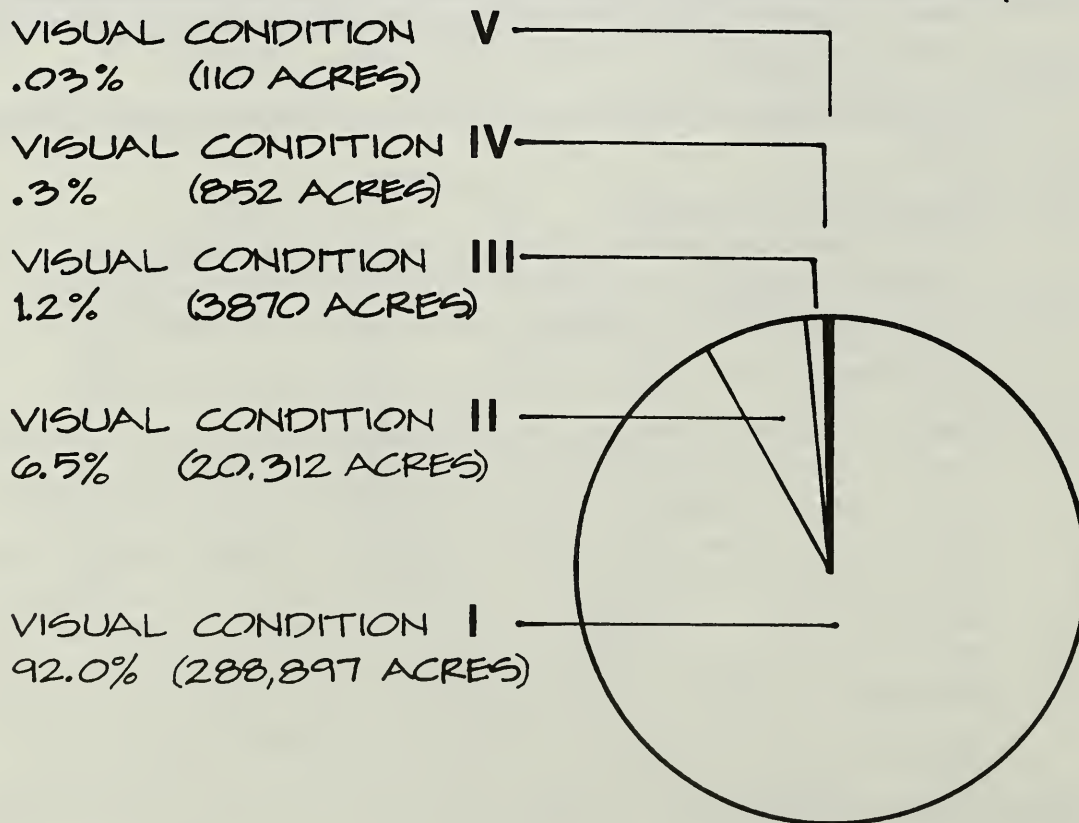
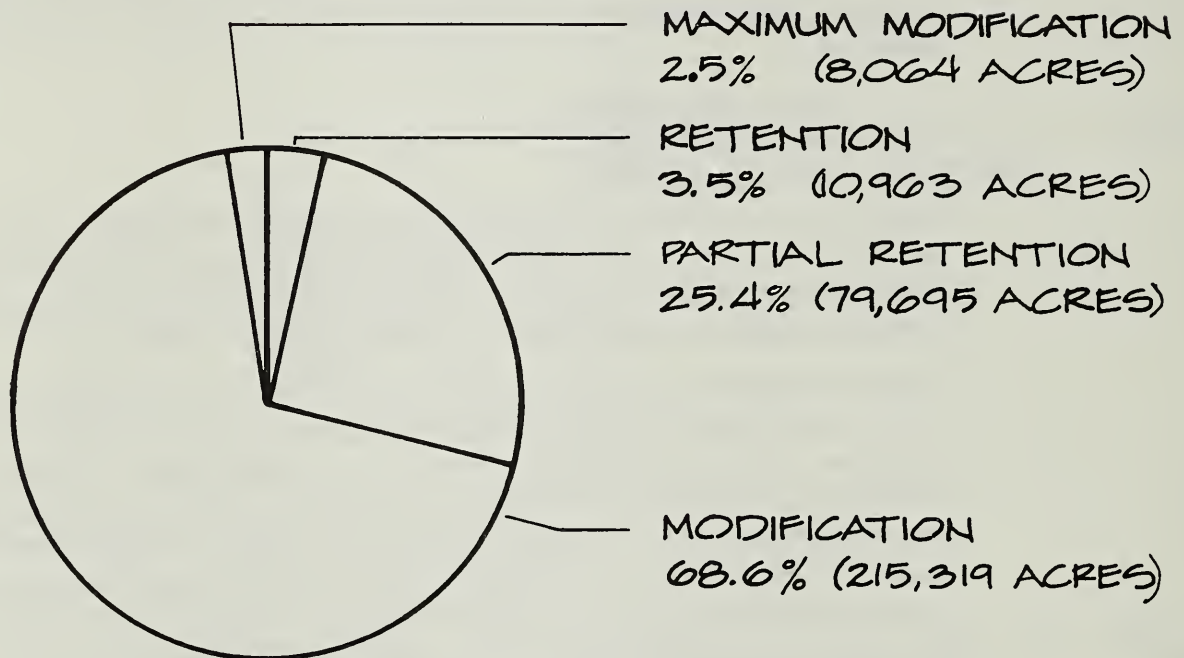
Figure 3-5 also illustrates the second primary baseline inventory of the forest landscape, the existing visual condition (EVC). The EVC defines how the Forest presently looks, in terms of how much evidence exists of human alterations.

The distribution of lands in each level is displayed in Figure 3-4 and Maps 3-7

Because of the limited access, use, and habitation of the islands up to this point, their overall appearance is quite natural with relatively isolated cases of changes created by humans. Figure 3-4 shows that the vast majority of the management area, 98.5%, is still natural in appearance. Only 1.5% of the landscape is noticeably altered and only about 0.3% of the landscape is actually dominated by human alterations. Examples of activities that have visibly affected the landscapes are the timber harvests along the inside of Montague Island in the 1970's and now largely revegetated areas, recreational cabins, navigational aides, ADF&G regulatory signs, and even beach debris left by the tides. Most of the impacts are relatively localized and minor and detract little from the overall sense of a landscape shaped much more by natural than human influences. Glaciation, landslides, weather and even earthquake fault patterns and uplift have more noticeably affected the overall landscape than have humans.

Figure 3-3

## VISUAL QUALITY OBJECTIVES



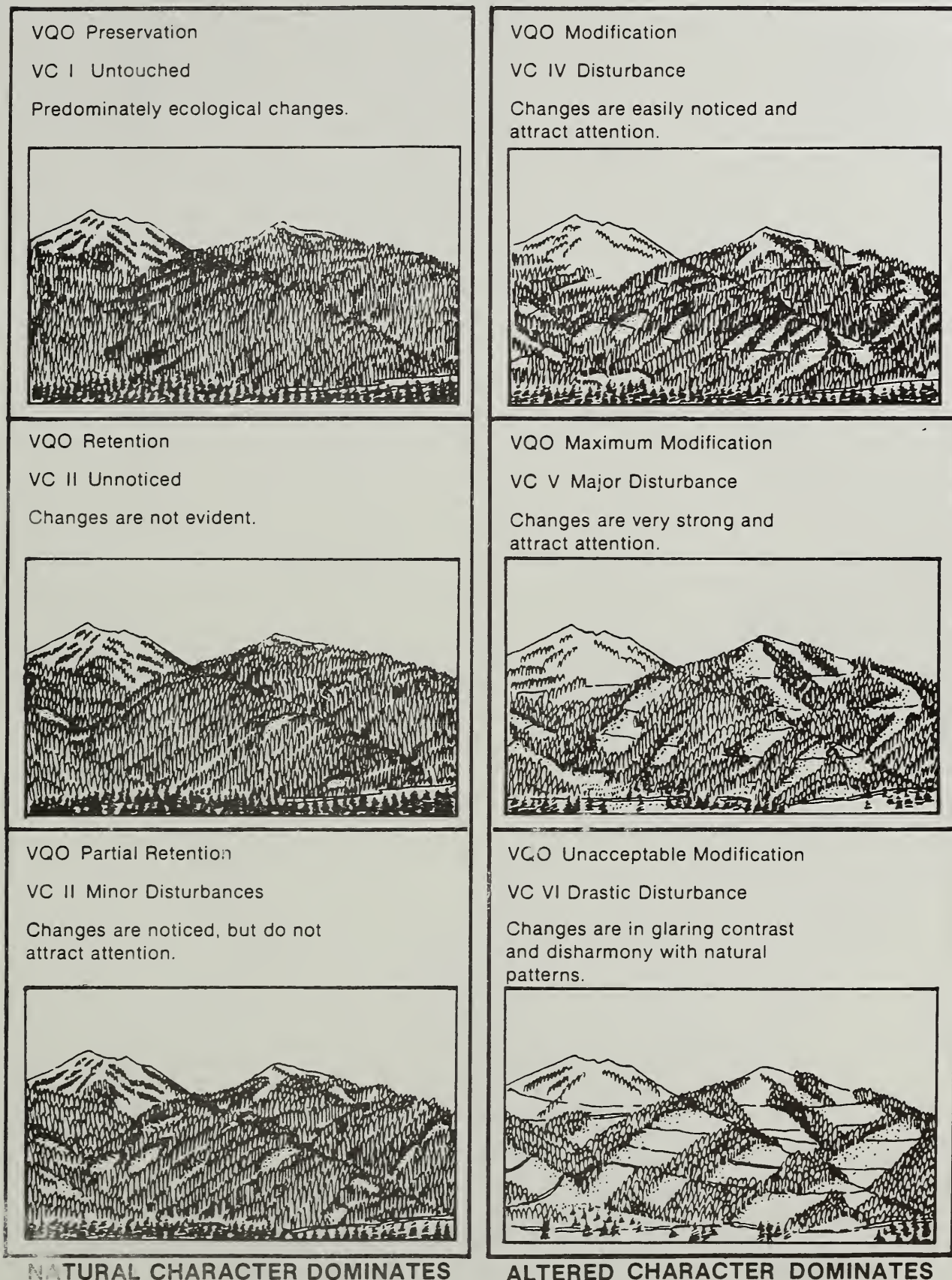
## EXISTING VISUAL CONDITION

Figure 3-4



Figure 3-5

Visual Condition (VC) - Visual Quality Objective (VQO)



1. *Phragmites*  
2. *Spartina*

3. *Scirpus* 4. *Cyperus*  
5. *Eleocharis* 6. *Distichlis*



7. *Tripsacum* 8. *Lythrum*  
9. *Verbena* 10. *Salvia*

11. *Origanum*  
12. *Thymus*







# DRAFT

## BIG ISLANDS MANAGEMENT AREA NORTH MONTAGUE ISLAND PORTION

### VISUAL QUALITY OBJECTIVES



### LEGEND

-  PARTIAL RETENTION
-  MODIFICATION
-  MAXIMUM MODIFICATION
-  State Selection Boundary

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989





# DRAFT

## BIG ISLANDS MANAGEMENT AREA

*SOUTH MONTAGUE ISLAND PORTION*



### *VISUAL QUALITY OBJECTIVES*

#### LEGEND

-  RETENTION
-  PARTIAL RETENTION
-  MODIFICATION
-  PRIVATE OWNERSHIP

SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION

*February 15, 1989*

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## BIG ISLANDS MANAGEMENT AREA





*GREEN ISLAND PORTION*

*Including the Needle*



## *VISUAL QUALITY OBJECTIVES*

### LEGEND

-  RETENTION
-  PARTIAL RETENTION
-  MODIFICATION
-  PROPOSED RESEARCH NATURAL  
AREA BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

*February 16, 1989*

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OF THE

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PHYSICIANS

HELD AT

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PHILADELPHIA

DECEMBER 28-31, 1900

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# DRAFT

## BIG ISLANDS MANAGEMENT AREA HINCHINBROOK ISLAND PORTION

### VISUAL QUALITY OBJECTIVES

#### LEGEND

- RETENTION
- PARTIAL RETENTION
- MODIFICATION
- MAXIMUM MODIFICATION
- PRIVATE OWNERSHIP
- LAND SELECTION BOUNDARY
- OWNERSHIP BOUNDARY



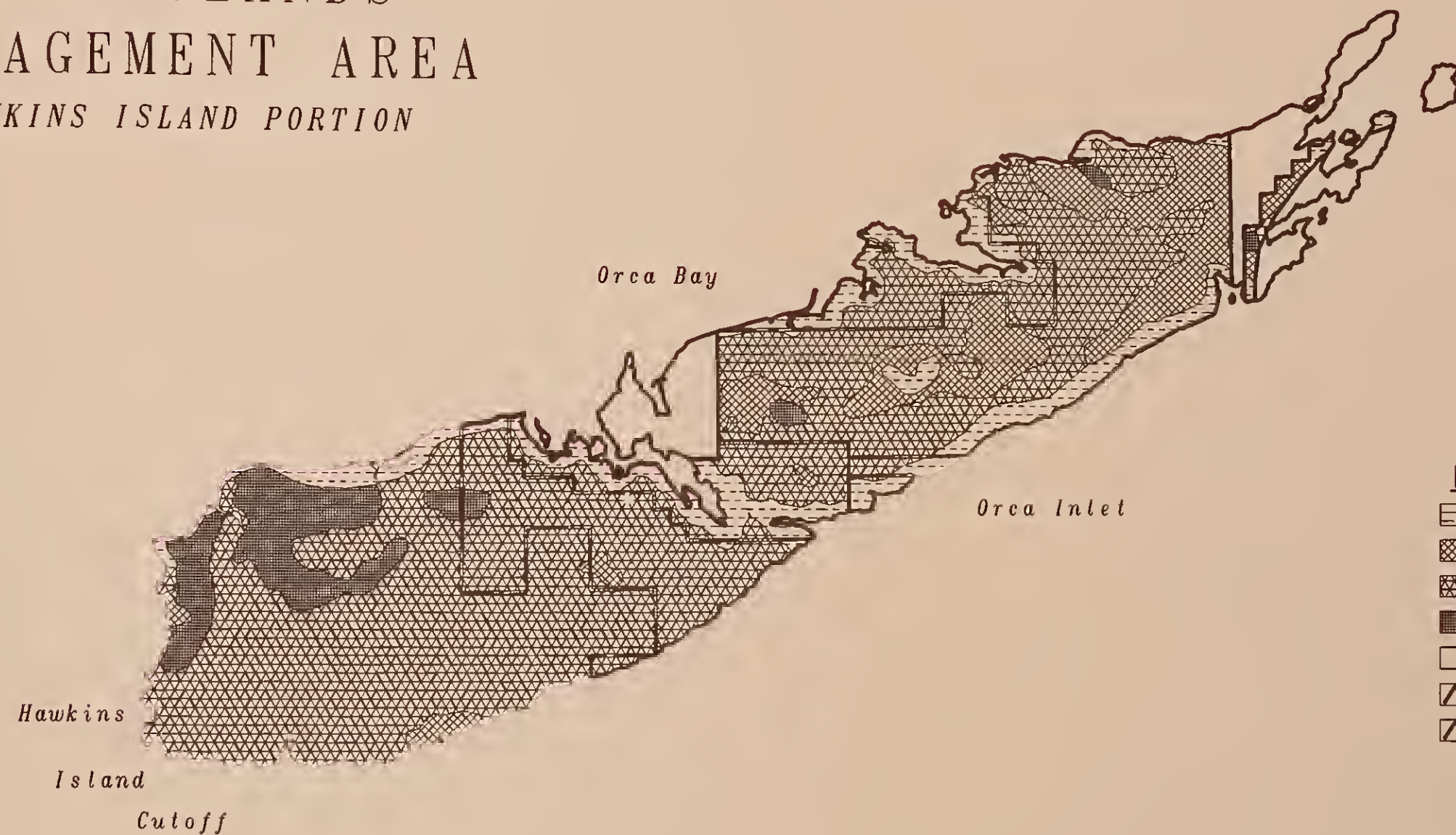
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CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 15, 1989












# DRAFT

## BIG ISLANDS MANAGEMENT AREA *HAWKINS ISLAND PORTION*



## VISUAL QUALITY OBJECTIVES

### LEGEND

-  RETENTION
-  PARTIAL RETENTION
-  MODIFICATION
-  MAXIMUM MODIFICATION
-  PRIVATE OWNERSHIP
-  LAND SELECTION BOUNDARY
-  OWNERSHIP BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

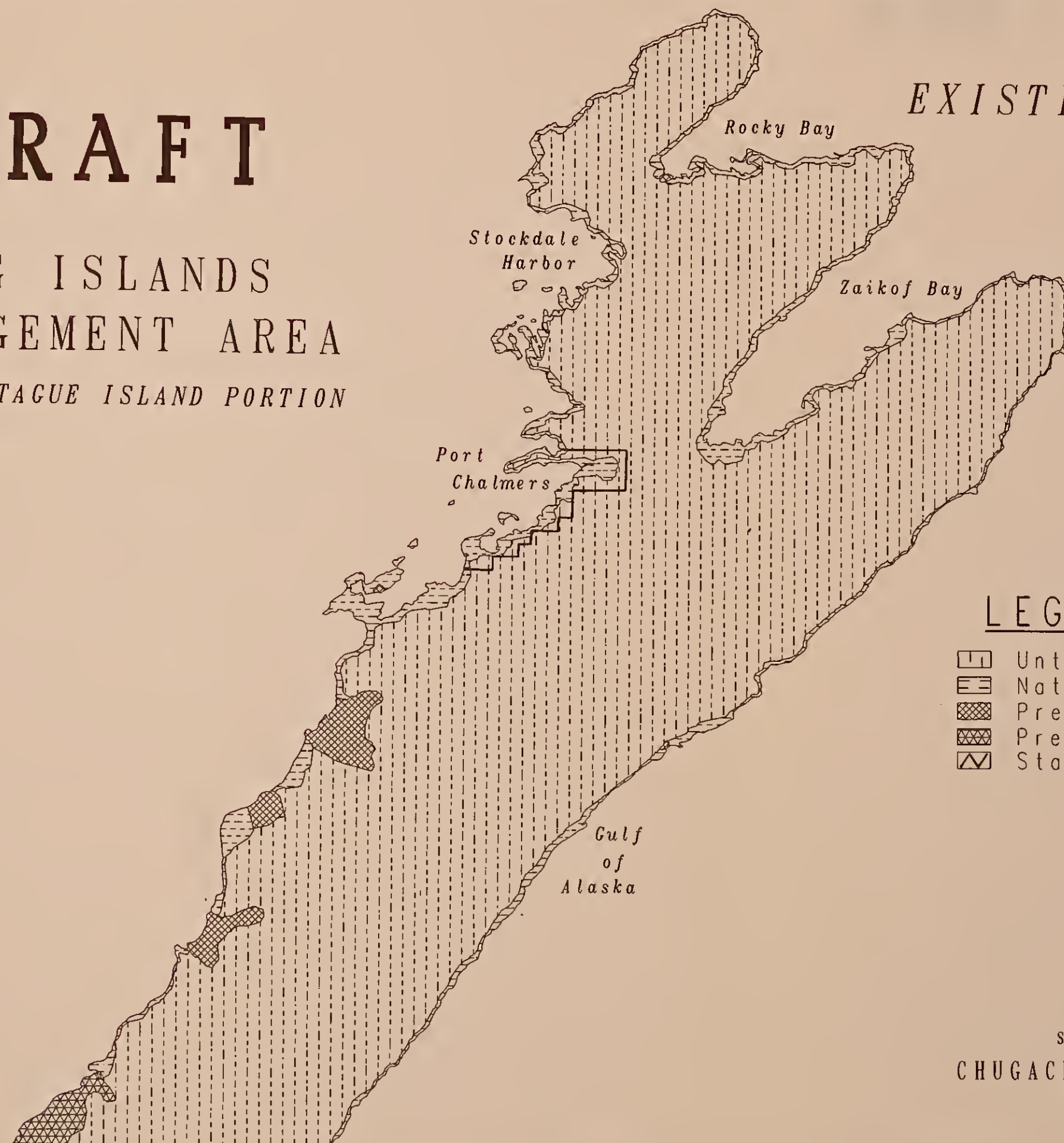
February 15, 1989



# DRAFT

## BIG ISLANDS MANAGEMENT AREA NORTH MONTAGUE ISLAND PORTION

EXISTING VISUAL CONDITION



### LEGEND

-  Untouched, Pristine Landscape
-  Natural Appearance
-  Predominantly Natural Appearance
-  Predominantly Altered Appearance
-  State Selection Boundary

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989

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



## BIG ISLANDS MANAGEMENT AREA

SOUTH MONTAGUE ISLAND PORTION

### EXISTING VISUAL CONDITIONS



### LEGEND

-  Untouched, Pristine Landscape
-  Natural Appearance
-  Predominantly Natural Appearance
-  Ownership Boundary

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989

DEATH

1900-1910

1911-1920

1921-1930

1931-1940

1941-1950

1951-1960

1961-1970

1971-1980

1981-1990

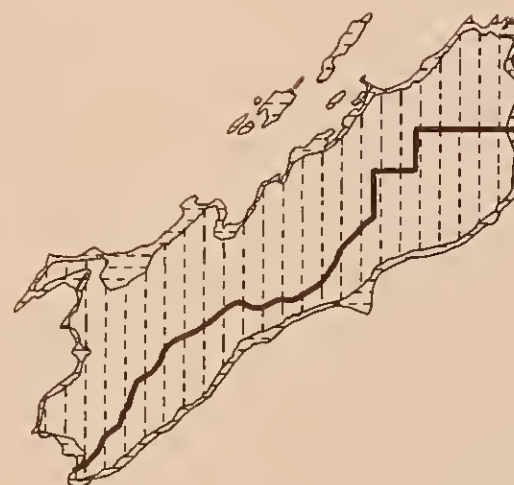
1991-2000

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## BIG ISLANDS MANAGEMENT AREA





*GREEN ISLAND PORTION*

*Including the Needle*



*EXISTING VISUAL  
CONDITION*

### LEGEND

-  Untouched, Pristine Landscape
-  Natural Appearance
-  Predominantly Natural Appearance
-  Proposed Research Natural Area Boundary

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 16, 1989

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## BIG ISLANDS MANAGEMENT AREA HINCHINBROOK ISLAND PORTION

### EXISTING VISUAL CONDITIONS



#### LEGEND

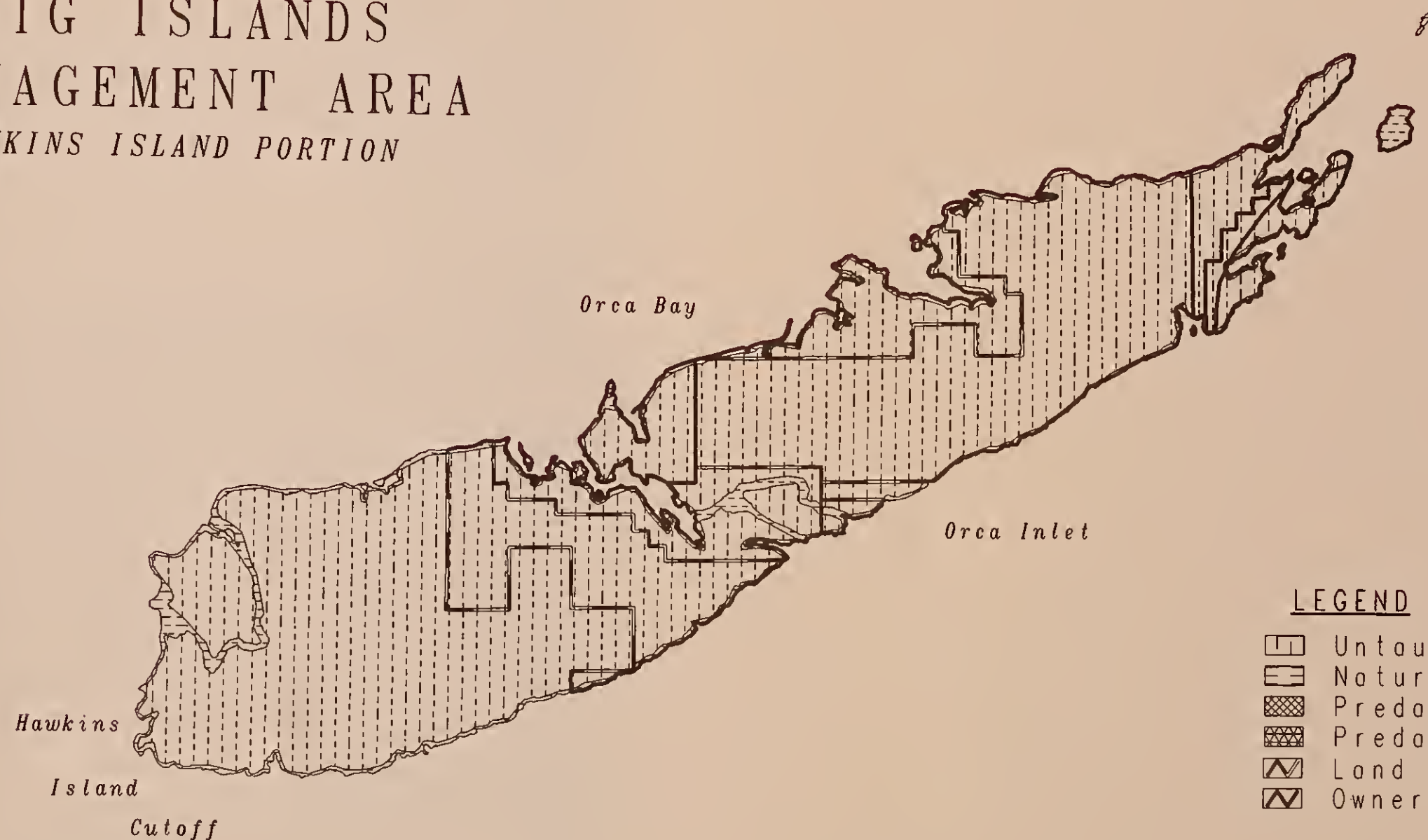
-  Untouched, Pristine Landscape
-  Natural Appearance
-  Predominantly Natural Appearance
-  Predominantly Altered Appearance
-  Heavily Altered Appearance
-  Land Selection Boundary
-  Ownership Boundary

SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 15, 1989









# DRAFT

## BIG ISLANDS MANAGEMENT AREA HAWKINS ISLAND PORTION



EXISTING VISUAL  
CONDITIONS

### LEGEND

-  Untouched, Pristine Landscape
-  Natural Appearance
-  Predominantly Natural Appearance
-  Predominantly Altered Appearance
-  Land Selection Boundary
-  Ownership Boundary

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST

ALASKA REGION

February 16, 1989



Thus the Big Islands Management Area landscape, generally, is currently in a much more natural condition than required by the VQO's. According to the Forest Plan, the VQO's would require 3.5% of the land base to remain natural in appearance, 25.4% to remain predominately natural, and would allow 71.1% of the landscape to be dominated by manmade alterations.

A few cases do exist where landscapes have been altered in excess of the levels specified by applicable VQO's. The FAA facilities east of Johnstone Point is one notable example (an EVC of V in a retention VQO area). This type of situation indicates a need for visual resource rehabilitation in order to bring the EVC into compliance with the VQO direction. Visual resource rehabilitation can include allowing natural processes to improve conditions over the course of time as well as more proactive strategies designed to achieve compliance.

2017 acres, less than 0.7% of the management area, can currently be classified as requiring rehabilitation.

### Visual Quality Index

The Visual Quality Index (VQI) quantifies the cumulative visual quality of the study area. It reflects both the inherent scenic value of the natural landscape and the amount of human modification of the landscape. The VQI for the existing visual condition is 98.6%. As a reference, if none of the management area had been altered by man, the VQI would be 100%. If all of the land base had been drastically disturbed, the VQI would be 30.2%. If the visual conditions of the area corresponded precisely to those called for by the VQO's, the VQI would be 63.8%, indicating that the EVC is, in total, higher than the visual condition required by the VQO's. It also shows, however, that the visual condition has declined from its originally natural condition.

While not a measure of how altered the landscape is currently, another indicator, visual absorption capability (VAC), does provide a sense of how visible a given activity will be in a given landscape. A comprehensive VAC inventory was not conducted for the MAA but qualitative observations were made to assist in the evaluation of the consequences of potential management activities. Many of the areas that have been identified for potential timber harvest activities have relatively high VAC primarily because of their minimal slopes. Most of the Nellie Martin drainage can be included in this category.

### Cultural Resources

The Big Island Management Area of Prince William Sound was occupied prehistorically by several of the eight tribes comprising the Chugach Eskimo Nation. The Shallow water People lived on the eastern half of Hinchinbrook Island and all of Hawkins Island. The western half of Hinchinbrook Island was inhabited by the Nuchek People while Montague and Green Islands were occupied by the Montague Island People. The prehistoric Chugach were a maritime oriented people whose activities only rarely penetrated inland. The specifics of their culture and environmental setting are provided in detail in the Cultural Resources Overview of the Chugach National Forest (Revised November, 1987).



The affected environment of the Big Islands Management Area also includes cultural features of historic significance related to the current dominant western culture. These include evidence of mining, timber harvesting, fox farming, fishing, hunting and trapping.

Fewer than 50 cultural sites have been identified on the National Forest lands in the management area. The majority of these sites have been selected by Chugach Alaska Corporation (CAC), under Section 14(h)(1) of the Alaska Native Claims Settlement Act (ANCSA) but the status of their selections have not yet been determined. Field surveys to locate all potentially eligible National Register sites have not been conducted except as project needs have dictated. The Native selected historic and cemetery sites [ANCSA 14(h)(1)] are still undergoing field verification for potential conveyance. Only two sites likely eligible for the National Register have been identified on the north end of Montague Island.

Prehistoric and historically documented human use patterns of the Big Islands Management Area allow for the development of a predictive model of sensitivity zones for cultural resources. Since evidence indicates prehistoric use of the MA was generally limited to the littoral zones of less than 100 feet elevation above tide level and historic use followed the same pattern, this strip of land is considered to have the highest potential for cultural resources. Prehistoric uses which differ from this general model include some hunting, gathering and burial practices.

Historically, mining activity frequently occurs outside the model in that their activities carried them to all areas of the land base. Thus, wherever mineral deposits have been identified, portages or corridors of human movement recorded or drainage systems identified as having or capable of having anadromous fish runs in the past, all are included within this zone of high sensitivity. The zone of low sensitivity or low probability for human presence (hence low cultural resource potential) includes areas of permanent ice and snow, swamps, bogs, active stream channels and alpine rock fields. Areas of 1,000 feet elevation and higher, unless already included in one of the high sensitivity zones, are also included. All other categories of human activity fall within an intermediate sensitivity zone. This model is more fully discussed in the Cultural Resources Overview of the Chugach National Forest (Revised November, 1987).

## Hydrology

Streamflow on the Big Islands varies with precipitation. Streams originating in low elevation areas along the outside coast have more moderated flows due to the lower precipitation there. Streams originating in mountainous parts of the Big Islands have much higher total flow volumes. They also have a large variability between high and low flows. This is particularly true of high gradient streams that allow for rapid runoff. Montague Island offers the most extreme examples, where streams with small drainage areas can carry enormous amounts of water during storm events. A flood event on Chalmers River on the north side of Montague was measured in excess of 600 cubic feet per second (CFS) per square mile of drainage area. Events considerably larger than this probably occur but have not been recorded. By comparison, many similar

drainage basins on the Kenai Peninsula show maximum flood events of 30 to 50 CFS/sq. mi.

The largest flood events on the Big Islands generally occur during the period from September through December when the largest storms move into Prince William Sound out of the Gulf of Alaska. Flood effects from these storms are greatly reduced when part or all of the storm comes as snowfall. In this case, the storm moisture goes into storage rather than immediately to runoff. In December storms decrease in size and are more likely to come as snowstorms.

Snowmelt runoff from higher elevation areas on the Big Islands tends to peak in May or June; however, these peaks are considerably smaller than the storm/flood events that occur during the fall. Montague Island has a number of small glaciers in high elevation areas along the north part of the island. These glaciers generally have a northern exposure, and runoff from the melting glaciers themselves generally peaks in late July or early August. These melt/runoff peaks are also much smaller than the rainfall runoff peaks which occur during the fall.

The streams on the Big Islands are clear and carry very little sediment during normal flow conditions. However, during large flood events, these same streams can carry extremely large sediment loads, due to the nature of the erosive sedimentary rocks found in the Management Area.

On Montague Island, portions of several watersheds are covered by glaciers. Glacial action works to scour the bedrock under the ice and contributes silt and larger sediment to the stream system. Glacial sedimentation of streams occurs primarily during the late spring and summer months. Glacial sediment loads on Montague are relatively small in comparison to stream sediment loads occurring during large flood events.

Active earth movement in the Big Islands allows for both up and down movement of the islands themselves, and active faulting of the bedrock. The faulting and fracturing of the bedrock tends to make it more susceptible to erosion during flood events. Tectonic events that uplift the islands (Montague was uplifted as much as 38 feet during the 1964 earthquake.) can cause a sudden steepening of stream gradient at the coastline. This, in turn, can cause the stream to "headcut", meaning that it incises itself more deeply, starting at the coast and moving back upstream. This headcutting adds considerably to stream sediment loads and will continue until the stream gradient reaches a temporary equilibrium.

Tidal fluctuations influence the hydrology and many natural and human-related activities at river mouths along the coast. The average daily tidal fluctuation in the management area is about 12 feet. The maximum daily tidal fluctuation is about 19 feet.

## Soils

There are three major ways in which the soil and landform characteristics are measured relative to the impacts from various management activities. These are the soil productivity, erosion potential, and mass movements.



Soil productivity is normally measured by the amount and type of vegetation that the soil and other site factors produce. The factors common to the more productive sites include soils that are moderately deep to deep, well drained and have an organic layer over two inches thick. These soils usually produce stands of large trees. Some soils are less productive because of thin organic surface layers, moderate drainage, shallow depths, or low nutrient content; or they have non-compatible site characteristics such as avalanches, bedrock outcrops, or unstable soils. These units will most often be vegetated with shrubs and herbaceous vegetation. Other soils have low productivity due to poor drainage or saturation by water conditions. They are normally vegetated with herbaceous and hydric vegetation. Highland areas with rock outcrops, snow-fields, and glaciers have a climate and other ecological conditions that are too harsh and unsuited for abundant vegetative growth. These are usually unvegetated or have minor amounts of moss or alpine vegetation.

Soil Erosion and sedimentation is not a major problem because most soils are covered by a layer of organic matter. Once the organic layer is removed, soils with a medium to fine texture are susceptible to erosion especially when they are located on slopes over 45 percent. Shallow soils regardless of the texture are more susceptible to erosion. Soils that are not covered with organic matter or that are located on floodplains near rivers and creeks are continually being eroded as a natural process of stream erosion.

Naturally occurring landslides are a common occurrence in the management area. High precipitation, steep slopes, and continuous undercutting of sideslopes by streams all contribute to the landslides on the islands. The potential for landslides increases as slope increases and may become serious on slopes over 75 percent that have had the vegetation removed. They may also be accelerated where roads are constructed across slopes where the soils are poorly drained, have a fine texture or a high amorphous component.

## Roadless Character

There is no designated wilderness on the Chugach National Forest, but 5,434,000 acres of land are capable for wilderness. Section 704 of the Alaska National Interest Lands Conservation Act also specified the 2,116,000 acre Nellie Juan - College Fiord Wilderness Study Area be reviewed to determine the suitability or unsuitability for preservation as wilderness.

The Record of Decision for the Forest Plan recommends 1,703,000 acres of Nellie Juan - College Fiord Wilderness Study Area or 29 percent of the 5,995,010 acre Chugach National Forest for Wilderness designation. This recommendation does not include any lands of the Big Islands Management Area.

Hinchinbrook Islands is being managed consistent with maintaining Primitive ROS class conditions until the Forest Plan is revised. The Forest Service will not schedule timber harvesting or road construction on Hinchinbrook Island prior to the revision of the Forest Plan. Other resource management activities consistent with the Primitive ROS classification may be initiated prior to the revision of the Forest Plan.

## Subsistence

Section 810 of ANILCA states:

"In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands the head of the federal agency having primary jurisdiction over such lands or his designee shall evaluate the effects of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for such purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit, or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency -

(1) gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to section 805;

(2) gives notice of, and holds, a hearing in the vicinity of the area involved; and

(3) determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions."

During the March 1986 Joint Boards of Fish and Game meetings, Game Management Unit 6 (GMU) (Prince William Sound); was determined to be rural for purposes of subsistence uses of resources, except for Whittier and Valdez. Approximately 6,434 people (1984 estimate) reside in GMU 6. Excluding the populations of Whittier and Valdez, about 2,479 people qualify for subsistence uses of resources in Prince William Sound. The majority of these residents are from Cordova, Tatitlek and Chenega Bay.

The community of Chenega was extensively surveyed in 1986 to determine subsistence use patterns. The Alaska Department of Fish and Game Subsistence Division collected information on historic and current use patterns, harvest areas, species utilized, pounds of resources collected and consumed and harvest methods.

During April and May 1988, 19 of 31 households in the community of Tatitlek were surveyed. ADF&G Subsistence Division mapped all areas used, areas used in 1987 and the most reliable areas for deer, goat, crab, shrimp, marine mammals, intertidal resources, waterfowl, marine fish, salmon, black bear, furbearers, vegetation and firewood.

As part of the information used to determine rural status, the Subsistence Division compiled a community summary for Cordova. That summary shows levels of household resource harvest and use for 1985 (ADF&G 1986a).

In 1987, ADF&G conducted a hunter survey to determine deer hunter use patterns in Unit 6. Deer hunter use surveys have also been conducted in 1980, 1983 and 1984. The surveys show where residents and non-residents of Unit 6 were hunting and where they were successful.



These reports, as well as the Recreation Resource Report for the Gravina-Big Island Management Area Analysis, were used to determine current subsistence use patterns in Prince William Sound and assess the impacts of proposed activities on subsistence resources.

The Board of Game has determined that black bear and mountain goats are subsistence resources used by local rural residents of GMU 6. No determination has been made for deer. Brown bear and moose are not used for subsistence purposes in GMU 6.

The ADF&G community summary for Cordova shows that all five species of salmon are used by a significant portion of the community. Halibut, dungeness crab, shrimp and bottom/rock fish are also used by large numbers of people. Over 64% of the households used deer. ADF&G survey report for 1987 estimated 2,669 deer were harvested by 1906 hunters, not all of whom were Unit 6 residents.

Areas traditionally and currently used by residents of Tatitlek for subsistence use of resources have been mapped. No information has been collected on the intensity of use for these communities. However, the level and kinds of resources used is probably very similar to use patterns by residents of the community of Chenega.

Marine mammals make up 39% of the Chenega community subsistence harvest by weight. Salmon make up 21%, game 20% and other Fish 16% of the harvest. Plants, birds and marine invertebrates each make up 1% of the harvest.

Per capita harvest of wild resources by Chenega residents was 361 pounds in 1985-1986 (1,286 pounds per household). Per capita use was 243 pounds ((866 pounds per household). This compares with a per capita harvest of 151 pounds and per capita use of 145 pounds by residents of Cordova.

Chenega residents use the Big Island Management area to a limited extent for subsistence resources. Deer are taken from Green Island, Deep Bay, Mud Bay, Windy Bay and Gravina Point. In the 1960s deer were taken from Zaikof Point and Montague Point on Montague Island (Stratton and Chisom, 1986).

Both air and boat charter operators indicate that the majority of hunters that use the south end of Montague Island fly out of Seward or Anchorage. Use of the north end of Montague and Hinchinbrook and Hawkins Islands is primarily by Cordova based hunters. Deer taken from hunters coming out of Anchorage or Seward cannot be considered to be used for subsistence purposes.

Table 3-11 shows the estimated deer harvest for the Big Islands between 1980 and 1987. Figures are taken from the 1987 Draft Alaska Deer Hunter Survey Game Management Unit 6 (Griese and Becker 1987). Deer make up almost 13% by weight of the wild resources used by Cordova residents and 14% of the Chenega use.

Cordova residents reported 31% of the households harvested deer in 1985 and 64% of the households used deer. The average harvest per household was 218 pounds.

The majority of salmon used for personal use in Prince William Sound are harvested by commercial methods. This is true both for Chenega residents and Cordova residents. According to Stratton and Chisom (1986) 61% of the salmon used by Chenega residents are harvested commercially and an additional 29 percent comes from non-commercial nets or other methods. Salmon makes up 31% by weight of the wild resources used by Cordova residents and 20% of the Chenega use.

Table 3-11

Average Deer Harvest

Big Islands Management Area, 1980-1987

|                     | 1980 | 1983 | 1984 | 1987 | Ave % |
|---------------------|------|------|------|------|-------|
| Montague Island     | 590  | 941  | 1138 | 980  | 45.0% |
| Hinchinbrook Island | 170  | 243  | 349  | 544  | 15.5% |
| Hawkins Island      | 249  | 266  | 232  | 448  | 15.0% |
| Green Island        | 52   | 48   | 66   | 33   | 2.5%  |
| Total Unit 6        | 1310 | 1951 | 2198 | 2669 | 100%  |

Deer hunting areas important to Unit 6 hunters are, in descending order of importance: South half of Hawking Island, Zaikof Bay-Rocky Bay-Stockdale Harbor area of Montague Island, north half of Hawkins Island, NW side of Hinchinbrook Island and NE side of Hinchinbrook Island. The area around Zaikof and Rocky Bay had the highest ratio of deer taken per day hunted during 1987.

Tatitlek hunters consider the Zaikof Bay-Rocky Bay area extending down to Port Chalmers important for deer hunting as well as the shoreline along the inside coast of Montague Island below Port Chalmers. Green Island as well as areas on Hawkings and Hinchinbrook Islands are also important deer harvest areas. Areas there include the south end of Double Bay, Anderson Bay, Eagle Point to Bear Cape and the area north and south of Windy Bay.

Anchorage based hunters concentrate most of their effort on Montague Island. The areas around Zaikof Bay-Rocky Bay-Stockdale Harbor; Hanning Bay-Macleod Harbor; and San Juan Bay-Patton Bay-Beach River areas are the most important areas hunted.

In 1987, Unit 6 hunters accounted for 32% of the hunting days and 49% of the deer killed. Other Alaskans accounted for 30% of the hunting days and 23% of the deer killed (Griese and Becker 1987).



## Social and Economic

The management of resources and environmental conditions in the Big Islands Management Area affect the social and economic well-being of people living in Prince William Sound and other Forest users. In this project area, the issues and concerns have ranged from favoring current dispersed recreation uses to more developed recreation uses and timber harvesting (Chapter 1). This section discusses the social and economic setting which will be affected by management decisions.

Because activities in the project area are linked to the Chugach National Forest Plan, the area influenced by decisions in this document includes the following Census Areas/Subareas: Anchorage Borough, Kenai Peninsula Borough, Matanuska-Susitna Borough, Valdez-Cordova, and Prince William Sound.

### Population

An estimated 325,000 people live within the five census areas. Eighty-five percent are in the greater Anchorage area (Anchorage and Mat-Su Boroughs). The population growth trend in the influenced area has been negative over the last few years, and is now growing very slowly. Estimates of future population growth to 1991 are on the order of about one percent per year.

With these low population growth rates, the demand for the use of all Forest resources will not increase appreciably from this source. The increased demand for the use of all Forest resources is expected to result from investments in new plant and equipment in the forest products industry, and increases in tourist visitation to the influenced area.

### Socioeconomic Overview

The socioeconomic sphere of influence of the Big Islands Management Area potentially includes the communities and settlements within Prince William Sound, as well as residents of Anchorage and Seward. After reviewing available socioeconomic data and public involvement information, the IDT concluded that the primary communities affected by allocation and management decisions contained in the Big Islands MAA are Anchorage, Seward, and Cordova. Anchorage residents use the area for a variety of recreational activities, while certain occupational sectors in Seward would benefit from tourism, logging, and wood processing activities occurring in the management area. Cordova residents use localized areas within or adjacent to Hawkins, Hinchinbrook, and Montague Islands for a variety of economic, recreational, and subsistence purposes. Secondary communities whose use of the area is less frequent include Chenega, Tatitlek, Whittier, and Valdez.

In general, the smaller communities, including Seward and Cordova, depend to some degree on resources from the forest and marine environments for employment, recreation, and subsistence. Lifestyles are characterized by remote living conditions, seasonal and cyclical employment opportunities, and escape from the problems of crime, crowding, noise, and pollution often associated with urban environments.

Many of the small communities are attempting to strike a balance between their desire to maintain relatively undeveloped natural environments, with their desire for increased economic opportunities and community growth. Debates over these issues are reflected in the comprehensive plans, coastal management programs, and natural resource management plans that have been developed by State and Federal agencies in the southcentral region of Alaska.

In addition, some Anchorage residents use the Big Islands Management Area (especially Montague Island) for a variety of recreational activities including kayaking, pleasure boating, deer hunting, and fishing. Much of this use occurs in conjunction with visits to Forest Service public use recreation cabins.

The following community profile information is presented to describe the socioeconomic dimension of the affected environment, and to provide the socioeconomic context for understanding and selecting among the different planning alternatives.

## **Community Profile Summaries**

The following community profile information was developed from existing sources available from State and Federal agencies, non-profit corporations, and the communities themselves. Summary socioeconomic data for each community, if available, are presented for such variables as population, employment, and recreational or subsistence use of renewable natural resources.

### **1. Cordova.**

The community of Cordova is located on the mainland in eastern Prince William Sound. It is accessible by the Alaska Marine Highway System and by commercial jet service, as well as commuter air service. The principal economic sector is commercial fishing.

Cordova's population has been relatively stable after a period of steady growth. The 1980 census estimated that approximately 1,879 people were living in Cordova. Of these, 1,446 were white, while 231 were either Aleut, Eskimo, or American Indian. Others included Blacks, persons of Spanish origin, and Asian and Pacific Islanders. (U.S. Department of Commerce, 1981.) The Alaska Department of Labor estimates that the 1985 population of the city proper was 1,901 people (Alaska Department of Labor, 1985). In addition, approximately 441 people were living outside the city limits (City of Cordova, 1986). In total, about 2,342 people were residing in the greater Cordova area in 1985.

Development of the Bering River coal mines and the Katalla oil fields around the turn of the century were major factors in the establishment of modern Cordova. The primary impetus to sustained growth, however, was the discovery of copper and the subsequent construction of the Copper River and Northwestern Railroad. During the period between 1906, when railroad construction was initiated, and 1938, when the mines closed, Cordova functioned primarily as a transportation center. Due to its proximity to prime fishing grounds, Cordova's economy today is dominated by fishing and fish processing. Other sectors of the economy include transportation, communication and utilities, construction, retail trade and services (such as finance, insurance,



and real estate), and local, State, and Federal government. Although there have been short-term periods of cyclical increase and decline, employment appears to be relatively stable. (Professional Fisheries Consultants, 1985, City of Cordova, 1986.)

Residents of Cordova rely heavily on the adjacent land and marine environment for recreational activities such as boating, camping, and sightseeing; and for the subsistence harvest of a large variety of species. Recreation-use information provided by the Cordova District Ranger indicate that recreation use (by both Cordova residents and non-residents) approximated 120,100 visitor days of participation on the Cordova Ranger District in 1986. (U.S.D.A. Forest Service, 1986). The overwhelming amount of this use (105,100 recreation visitor days) occurred in undeveloped, dispersed areas. The three recreational activities in which people most frequently engaged were power boating, auto travel, and tour boat use, which accounted for 31,200, 14,200, and 12,000 recreation visitor days respectively.

The importance of hunting, fishing, and gathering activities is reflected by data collected by the Alaska Department of Fish and Game, Division of Subsistence, in 1985. A sample of 206 households were interviewed. Preliminary data suggest that the average Cordova household harvested approximately 400 pounds of fish, wildlife, and plants. Of this sample, 59 percent harvested silver salmon, 44 percent harvested red salmon, and 30 percent harvested king salmon. This harvest represents 14,623, 7,628, and 7,985 pounds respectively. Nearly a third of the sample households harvested deer. A total of 218 deer were taken, representing 8,720 pounds. Through sharing of deer meat, nearly two-thirds of the sample households indicated they used deer meat. (Alaska Department of Fish and Game, n.d.)

## **2. Chenega.**

The village of Chenega was originally located on the south side of Chenega Island in southwestern Prince William Sound. During the Good Friday earthquake of 1964, a tidal wave generated by the earthquake destroyed the village and killed 23 residents. Survivors were relocated to Tatitlek, Cordova, Valdez, and Anchorage (North Pacific Rim, n.d.; Stratton and Chisom, 1986.) A move to re-establish the community gathered momentum in the late 1970s. A site was selected on Evans Island, approximately 35 miles from the original village. Resettlement began in 1983 and continued through the fall of 1984. Motorized access is by float plane or boat.

Although estimates vary, reliable data by Stratton and Chisom (1986) indicated that the population of Chenega stood at 57 in 1985. Alaska Natives comprised 77 percent of the population, while the remaining 13 percent consisted of whites, primarily school teachers and their families. Residents of Chenega have strong ties to the Prince William Sound area. According to Stratton and Chisom (1986), seventy percent of the Chenega residences were either born in the Prince William Sound region, or had parents living in the area at the time they were born. Further, in nine of the 16 households interviewed in 1985, at least one of the adults living in the households was originally from the old village of Chenega. In four additional households, at least one adult had relatives from the old village.

The governing body of Chenega consists of an Indian Reorganization Act (IRA) Council that is responsible for a variety of governmental functions, including planning and community development, health and safety, and education. In 1986, the village possessed a recently-installed water treatment plant, a sewer system, and a 100 kilowatt power plant. The community also employed a village public safety officer and a health aide. In 1986, 18 children were enrolled in the school. Three full-time teachers, a part-time aide, and a maintenance worker staffed the school. Commercial goods are available to Chenega residents through the community store.

Employment opportunities in Chenega are severely limited and highly seasonal. In addition to government employment, construction and commercial fishing are the primary economic activities in Chenega. Twenty-five of the 57 residents responding to the Stratton and Chisom (1986) survey indicated some level of seasonal employment within the previous year. They found that, when averaged across the total employed population, the average length of employment was 4.9 months per person in 1985-86, down slightly from the average of 6.4 months per person during the 1984-85 period.

Subsistence use of fish, wildlife, and plant resources may compensate somewhat for the lack of employment. During the 1985-86 period, residents of Chenega harvested an average of 1,286 pounds of edible resources per household. On a per capita basis, this represents 361 pounds of fish, wildlife, and plants per person. Principle species harvested in terms of total number of pounds include salmon (all species--286 pounds per household), marine mammals (500 pounds per household), deer (183 pounds per household), and halibut (156 pounds per household). In addition, a wide variety of other fish, shellfish, waterfowl, furbearers, land mammals, and plants were utilized by the community. Although subsistence harvest activities are somewhat concentrated in the areas around Evans Island, maps of subsistence use indicate that Chenega residents range extensively over much of Prince William Sound in harvesting subsistence resources. Deer harvest, for example, took place on Hawkins and Montague Island, while marine mammal harvest occurred as far north as College Fiord. (Stratton and Chisom, 1986).

### 3. Seward.

The community of Seward is situated at the head of Resurrection Bay on the Kenai Peninsula. Seward served as the major port and point of transshipment to Anchorage and Fairbanks from the time it was established in 1903 until the 1964 earthquake. Currently, it serves as the southern terminus for the Alaska Railroad, and it is also accessible by all-weather highway from Anchorage. The Alaska Marine Highway provides transportation between Seward and certain communities in Prince William Sound and on the Kenai Peninsula. The fact that government is the major employer in Seward contributes to the relative stability of the population. From the 1980 census through mid-year, 1985, the population had grown by 309 people, from 1,843 to 2,152--a 17 percent increase (Alaska Department of Labor, 1987). In 1980, the Native population stood at 238, while the white population totalled 1,564 (U.S. Department of Commerce, 1981). A census conducted in 1982 by the Kenai Peninsula Borough indicated that the Native



population had increased to 325, and comprised 18 percent of the Seward's total population (North Pacific Rim, n.d.).

Principle components of the economy include local, State, and Federal government; commercial fishing and fish processing, and tourism. Government institutions provide relatively-stable employment when compared to the cyclical nature of resource extraction industries such as timber or fishing. The labor force in the Seward census District grew from 1,362 in 1974 to 1,967 in 1984. Employment increased from 1,141 to 1678 between 1974 and 1984. Total employment in the Kenai-Cook Inlet Census Division increased 122 percent from 1974 to 1984, but "The Seward area saw its total employment increase less dramatically with 47.1 percent growth over the ten year period and 11.7 percent between 1983 and 1984", (Kenai Peninsula Borough, 1988). Historically, the unemployment rate in Seward has ranged from a high of 16.7 percent in 1965 to a low of 11.9 percent in 1975 (Simpson Usher Jones, 1979). The unemployment rate decreased slightly over the 1974-1984 ten-year period from 16.2 percent to 15.0 percent. (It is important to note that the portion of the workforce employed in the fisheries harvesting industry is generally self-employed--and are, thus, not reported in State employment/unemployment statistics.)

Seward residents engage in a variety of hunting and fishing activities. Seward is a popular recreational destination for pleasure boating and salmon fishing; it hosts one of the most popular salmon derbies in Alaska. An important component of the city's comprehensive plan was to develop much-needed recreational facilities for residents and tourists alike (City of Seward, 1985). Seward serves as the entry point for most of the visitors using the south end of Montague Island.

#### **4. Tatitlek.**

The village of Tatitlek is located between Valdez Arm and Port Fidalgo on Tatitlek Narrows in northeastern Prince William Sound. It is accessible by boat and by small aircraft. The population of Tatitlek was determined to be 68 in the 1980 census. Since then, it has risen to 110 in 1984 and 112 by mid-1985 (Alaska Department of Labor, 1987). Of the 68 people living in Tatitlek in 1980, 53 were Alaskan Natives, while whites numbered 14. Tatitlek residents rely primarily on fishing and fish processing for their livelihoods. The North Pacific Rim Corporation conducted a survey in Tatitlek in 1981 which indicated that over 60 percent of the Native households have incomes of less than \$15,000 per year, while 44 percent of the Native households have incomes of \$10,000 or less (North Pacific Rim, n.d.). Tatitlek has an IRA Council form of government which provides a number of community services including community planning, bulk fuel storage and operation, and operation and maintenance of the community water, sewer, solid waste, and electrical systems. The IRA government is attempting to encourage local economic development that is stable, yet culturally acceptable to the community (North Pacific Rim, n.d.).

Subsistence harvest and use of renewable natural resources plays a major role in Tatitlek. The North Pacific Rim survey indicated that 83 percent of Tatitlek households engaged in at least one subsistence activity.



## 5. Whittier.

The city of Whittier is located at the head of Passage Canal at the western periphery of Prince William Sound. The economy is dominated by government, commercial fishing, and tourism. Whittier is served by the Alaska Marine Highway System and the Alaska Railroad.

Unlike many of the other communities in the Prince William Sound region, Whittier's population is subject to extreme fluctuations, due in part to the special circumstances surrounding the establishment of the community and subsequent development. Whittier's initial population increase was associated with the Army base. Population rose to nearly 1,000 in the 1950s, only to experience precipitous declines when the base was decommissioned. The 1970 census counted 130 people (City of Whittier, 1988). In addition to the seasonal influxes of recreational visitors during the summer months, Whittier's permanent population continues to vary considerably. In 1980, the population stood at 198. By 1984, it had increased to 268. In mid-1985, the Alaska Department of Labor estimates that the population of Whittier was 344 (Alaska Department of Labor, 1987). Of the 198 people inhabiting the community in 1980, 17 were Alaskan Natives.

Major components of the Whittier economy include government, transportation services, commercial fishing and fish processing, retail trade and services, and recreation/tourism. State, Federal, and local government employment contributes about two-thirds of the full-time jobs in Whittier--approximately 50 in 1988. The retail trade and services sectors--including motels, bars, restaurants, and grocery stores--serve both local residents as well as tourists. Halibut and shrimp fishing are the major commercial fishing enterprises in Whittier. The 15-20 halibut boats that operate out of Whittier land approximately 20,000 pounds per year. Approximately 15-20 Whittier-based boats fish commercial for shrimp. About two-thirds of the shrimp harvested in Prince William Sound are either processed in or shipped through Whittier. Whittier serves as the entry point for recreational boat traffic to enter Prince William Sound from residents of mainland southcentral Alaska. Tourists also arrive in Whittier via the Alaska Railroad from Anchorage. They also come on the Alaska Marine Highway and as passengers on one of the 57 cruise ships that now make Whittier a port-of-call. Tourism and, to a lesser extent, recreation use, are transient activities in Whittier, largely non-existent in the winter months but providing large seasonal influxes during the summer (City of Whittier, 1988).

Further community expansion and development is hampered by the existing land-ownership pattern. Although approximately 17 square miles are contained within the city limits, a significant portion of the land is owned by the Federal and State governments. This restricts residential and business development. Residential subdivisions have been proposed for some of the land the city selected from its State entitlements.

Located as it is in protected waters in close proximity to Prince William Sound, recreational activities of Whittier residents are marine-oriented. Residents and visitors alike participate in motorboating, sightseeing, sportfishing, sailing, crabbing, and recreational shrimp fishing in Prince William Sound. (City of Whittier, 1984). Whittier's boat har-

bor provides a base of support for these activities, and the popularity of marine-related recreation in Prince William Sound is supported by the fact of a 5-7 year waiting period for a slip.

#### **6. Valdez.**

The city of Valdez is located at the head of Port Valdez, a fjord in northern Prince William Sound. Access to Valdez can be gained by commuter airline, the Alaska Marine Highway System, and via the Richardson Highway. Extensive damage from shock waves and subsequent tidal waves resulted from the 1964 earthquake. After the earthquake, the community was relocated and re-established to a new site thought to be more safe in the event of future earthquakes. Valdez is a first-class city, home rule form of government. Valdez serves as the southern terminus of the Trans-Alaska Oil Pipeline.

Population has been relatively stable during the 1980s. The 1980 census identified 3,079 residents. The population saw an increase to 3,388 in 1984, but declined slightly to 3,271 by July, 1985 (Alaska Department of Labor, 1987). The 1980 census indicated that the racial composition of Valdez included 2,745 whites, 175 people of Alaskan Native origin. Other residents included 63 Asian and Pacific Islanders, 49 people of Spanish origin, and 38 blacks.

The economy of Valdez is supported by tax revenues from oil and gas property. In 1983, for example, Valdez collected oil property tax receipts in the amount of \$17,918,701. Although the petroleum industry is the mainstay of the Valdez economy, the economic base is fairly well diversified. Statistics available through 1983 indicate that, although employment opportunities are cyclical in nature, they are spread throughout a variety of economic sectors including construction, transportation, communications, public utilities, wholesale and retail trade, commercial fishing and fish processing, other private sector services, and Federal, State, and local government agencies (City of Valdez, 1986). Fish processing is expected to experience major growth and contribute additional employment opportunities. The tourism sector has grown rapidly. Commercial tours and charter services, exploiting such attractions as sportfishing and the nearby Columbia Glacier, operate during the summer season providing seasonal jobs.

Information provided by community workshops and surveys conducted for the Coastal Management Program indicate that the most important lifestyle values expressed by Valdez residents were the natural setting and small town character, the coastal environment, recreation opportunities, employment opportunities, and hunting and fishing. Over half the respondents expressed interest in fishing, saltwater boating, and hiking (City of Valdez, 1986).

#### **Economy**

Natural resources are important to the economy of Southcentral Alaska. Fishing, fish processing, recreation, tourism, and wood products have had a historical importance in regional employment.



As of 1988, the proportion of employment to total employment in the influenced area, by resource dependent use was as follows: fishing and fish processing, 30 percent; recreation and tourism, 30 percent; and wood products, one percent.

As with the state of Alaska as a whole, the Southcentral Alaska economy has been affected by the downturn in oil prices. The Anchorage Borough has been particularly hard hit, with significant declines in the retail sales, housing and transportation sectors of the economy. Future recovery of the economy in light of current oil price levels is uncertain at best, and emphasises the importance of other natural resource based industries to maintaining or improving employment opportunities in the area.

## **Current and Future Demands for Forest Outputs**

### **Recreation and Tourism**

The Big Island area of Prince William Sound is generally undeveloped and supports a variety of recreation activities that are dependent on a number of factors. Current recreation use of the area is minor relative to the rest of the Forest due to lack of access. Access is limited to aircraft or boats. The commercial fishing fleet makes recreational hunting and fishing use of the area during closed periods and before/after fishing seasons. Access by aircraft is provided chiefly by air taxi services for recreational hunting and fishing use.

In terms of public sector facilities, there are nine public recreation cabins in the Big Island management area. The total capacity of these cabins is 53 persons at one time. All of the Forest Service cabins received moderate to heavy use. Requests for cabin use have exceeded the capacity of the existing facilities on the Forest, and has been greatest for the cabins on South Montague Island.

Recreation use for the Big Island management area was estimated at 25,000 recreation visitor days (RVDs) in 1986, including 5,800 in developed sites (recreation cabins) and 19,200 in dispersed areas. This compares with an estimated 14,800 RVDs shown in the 1984 Forest Plan, based on 1981 Recreation Information Management (RIM) data. This 59 percent increase in RVDs is due to both actual increases in use and improvements in the data collection process. The major uses are boating, viewing scenery, cabin use, and deer hunting in the management area.

Tourism has increased substantially over the last 5-10 years in Prince William Sound as a whole. As an example, tour boat dockings annually have increased from 0 in 1980 to 88 in 1988. In the Big Islands Management Area, private sector tourism services, in addition to air taxi services, emphasize outfitter/guide services. Services provided include guided hunting and fishing, and drop-off service with a temporary camp. Current tourism services include seven outfitter/guides, cruise ships, flight-seeing, and the MacCleod Harbor Lodge.



### **Commercial and Sport Fisheries**

Prince William Sound, including the Big Islands Management Area, is noted for its commercial and sport fisheries for salmon, herring, halibut, bottomfish, crab, and shrimp. In 1987, 1,067,000 pink salmon and 35,000 chum salmon were harvested in the waters adjacent to the Big Islands management Area. The total estimated commercial value was \$1,281,951 or about three percent of the entire Prince William Sound salmon fishery.

The value should be considered a minimum since some of the catch may have been delivered to tenders in other districts. The commercial catch and relative proportions of the catch in the different district also differ from year to year depending on the strength of the runs, the timing of the fishery openings, and the distribution of the fishing effort. Interception of fish bound for other spawning areas is unknown but is assumed to be minimal. Approximately 82-88 percent of the wild stock pink salmon and 97.5 percent of the wild stock chum salmon produced within the management area are produced on National Forest lands.

Streams and lakes in the management area and the adjacent salt water areas support a substantial sport fishery. Several stream systems in the planning area are well known for their sport fisheries; the most popular areas include the Nellie Martin River, San Juan Bay, Shelter Bay, and Makaka Creek. Other popular sport fishery areas are associated with forest recreation cabins. The magnitude of the sport fish harvest in the management area and the economic values are unknown.

### **Hunting and Trapping**

The Big Islands Management Area is commonly used for brown bear and deer hunting. About twenty percent of the brown bear and 75 percent of the yearly deer harvest in the Prince William Sound area occurs within the management area. In addition, about 50 percent of the brown bear and five percent of the deer hunters are non-residents. Current hunting use within the management area is estimated at 1300 hunters over 6000 hunting days.

### **Timber**

The importance of timber in the project area (South Montague Island) is linked with the timber supply in the overall Big Islands Management Area. Timber from the Chugach National Forest is used locally for rough cut dimension lumber and planed dimension lumber from the new mill at Seward.

The market area served by the Big Island Management Area also receives timber from Prince William Sound, part of the Cordova Ranger District and the Kenai Peninsula, part of the Seward Ranger District. Currently, the forest supplies about ten percent of all the timber used in the dimension lumber markets. The forest does not supply logs for the export market.

Timber harvest on private lands within the market area has been directed towards log exports. With completion of the new 20 million board foot dimension lumber mill at Seward, however, private harvested timber in Prince William Sound and Montague Island will also be used for lumber production.

In Fiscal Year 1988, 85.6 million board feet (mmbf) of timber was either exported as logs or processed as dimension lumber in Southcentral Alaska, with a total value of \$34 million.

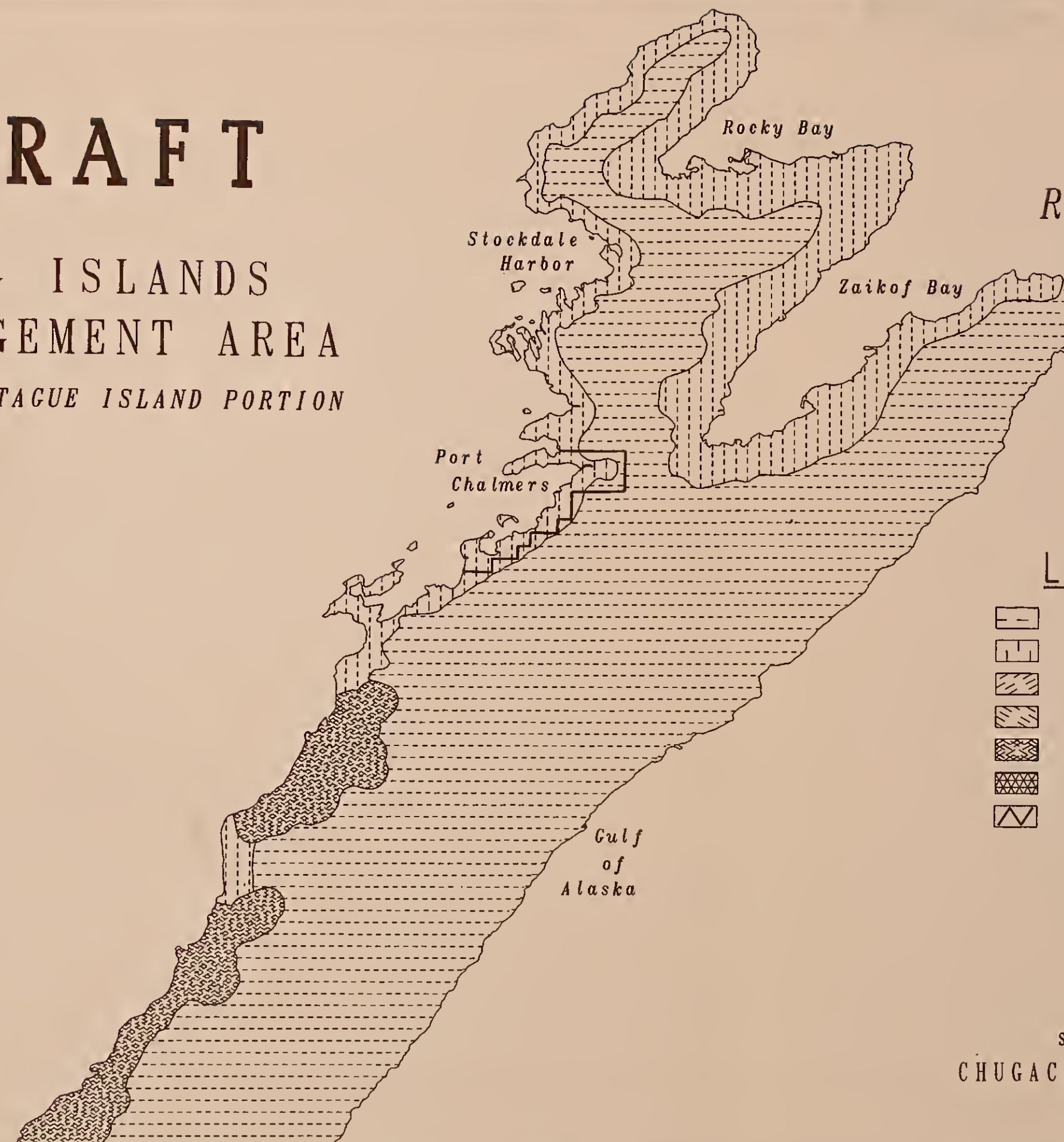
Short term expectations in Pacific Rim markets for lumber and wood products from Alaska are good. Continued expansion in the United States and the Pacific Basin coupled with a more internationally competitive dollar fueled rapid growth in Alaskan exports of forest products in 1988. The value of forest products exported to foreign countries from Alaska has increased from \$204.5 million in 1985 to \$474.7 in 1988. The boost in competitiveness from currency shifts and market growth lifted prices for some Alaskan forest products exports to record levels.

International exports of softwood logs from Alaska exceeded \$260 million in 1988, growing 10.5 percent in volume from 436 mmbf in 1987 to more than 482 mmbf in 1988. The average market value for all log exports reached a record \$543 per mbf. The value of Alaskan lumber exported to foreign destinations has more than doubled over the last two fiscal years rising from \$24.7 million in 1986 to more than \$52 million in 1988. Within the next year, continued expansion is expected as several Alaskan lumber processors begin production in new facilities. Lack of kiln and custom cutting facilities continue to plague efforts by Alaskan lumber manufacturers to tailor output to the specific needs of wholesalers and end-users abroad. A shortage of transoceanic containers and rising freight rates further compound, but have not prevented, increased diversification with an emphasis on processing to add value to the Alaskan-produced product.








# DRAFT

## BIG ISLANDS MANAGEMENT AREA NORTH MONTAGUE ISLAND PORTION

## EXISTING RECREATION OPPORTUNITY SPECTRUM



### LEGEND

-  PRISTINE
-  PRIMITIVE
-  SEMI-PRIMITIVE NONMOTORIZED
-  SEMI-PRIMITIVE MOTORIZED
-  ROAD MODIFIED AREA
-  RURAL
-  STATE SELECTION BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989



DEAD

1911

WINTER 1911

1911

# DRAFT

## BIG ISLANDS MANAGEMENT AREA

SOUTH MONTAGUE ISLAND PORTION

EXISTING RECREATION  
OPPORTUNITY SPECTRUM



### LEGEND

- |  |                             |
|--|-----------------------------|
|  | PRISTINE                    |
|  | PRIMITIVE                   |
|  | SEMI-PRIMITIVE NONMOTORIZED |
|  | SEMI-PRIMITIVE MOTORIZED    |
|  | ROAD MODIFIED AREA          |
|  | RURAL                       |
|  | OWNERSHIP BOUNDARY          |

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST

ALASKA REGION

February 15, 1989

# DEATH

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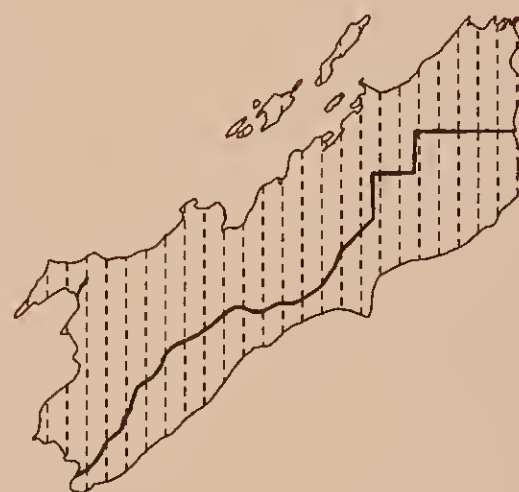


# DRAFT

## BIG ISLANDS MANAGEMENT AREA

*GREEN ISLAND PORTION*

*Including the Needle*



## *EXISTING RECREATION OPPORTUNITY SPECTRUM*

### LEGEND

-  PRIMITIVE
-  RESEARCH NATURAL AREA BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

*February 16, 1989*

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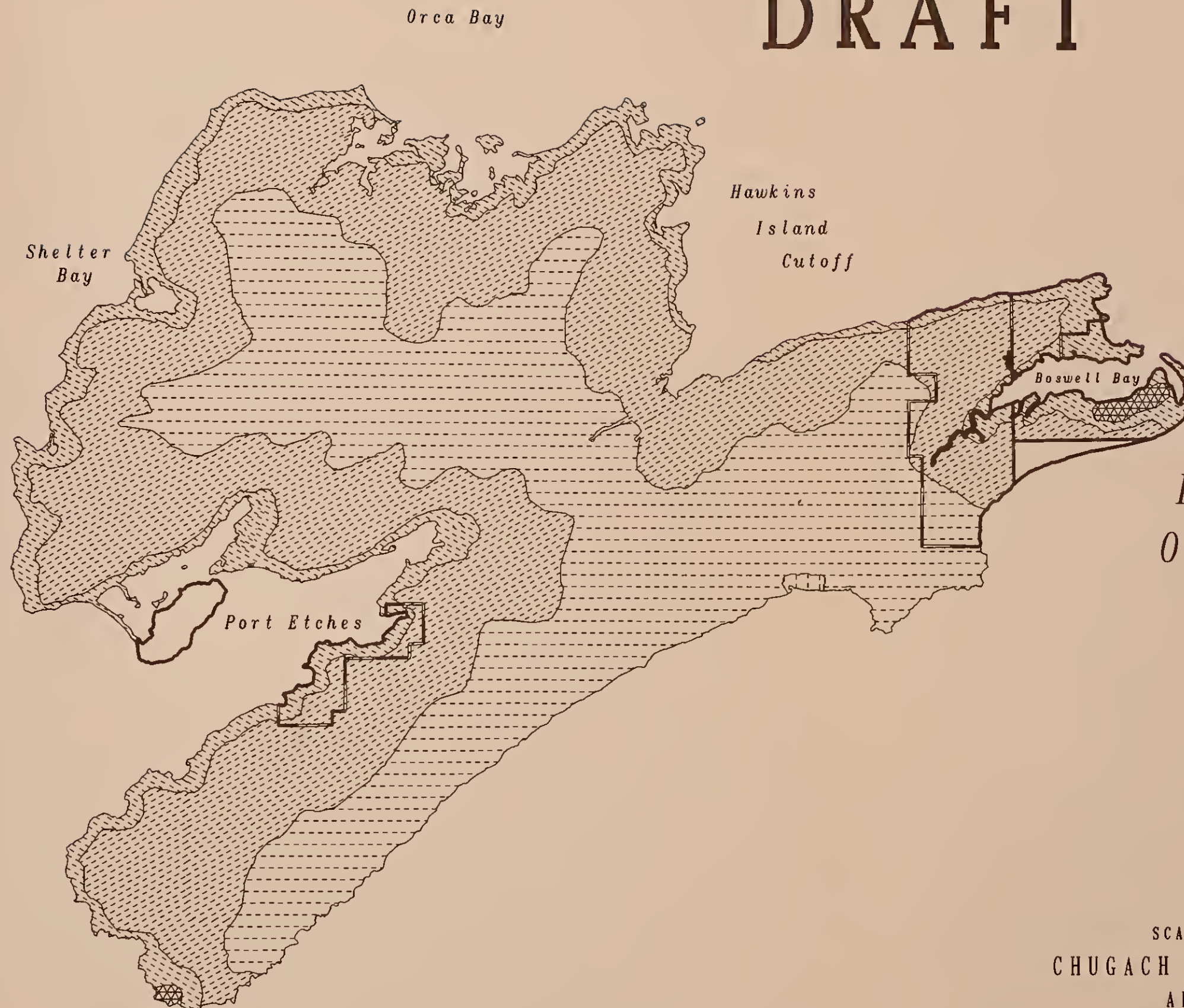
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# DRAFT

## BIG ISLANDS MANAGEMENT AREA HINCHINBROOK ISLAND PORTION

### EXISTING RECREATION OPPORTUNITY SPECTRUM



#### LEGEND

- Pristine
- Primitive
- Semi-Primitive Non-Motorized
- Semi-Primitive Motorized
- Rural
- Private Ownership
- Land Selection Boundary
- Ownership Boundary

SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989

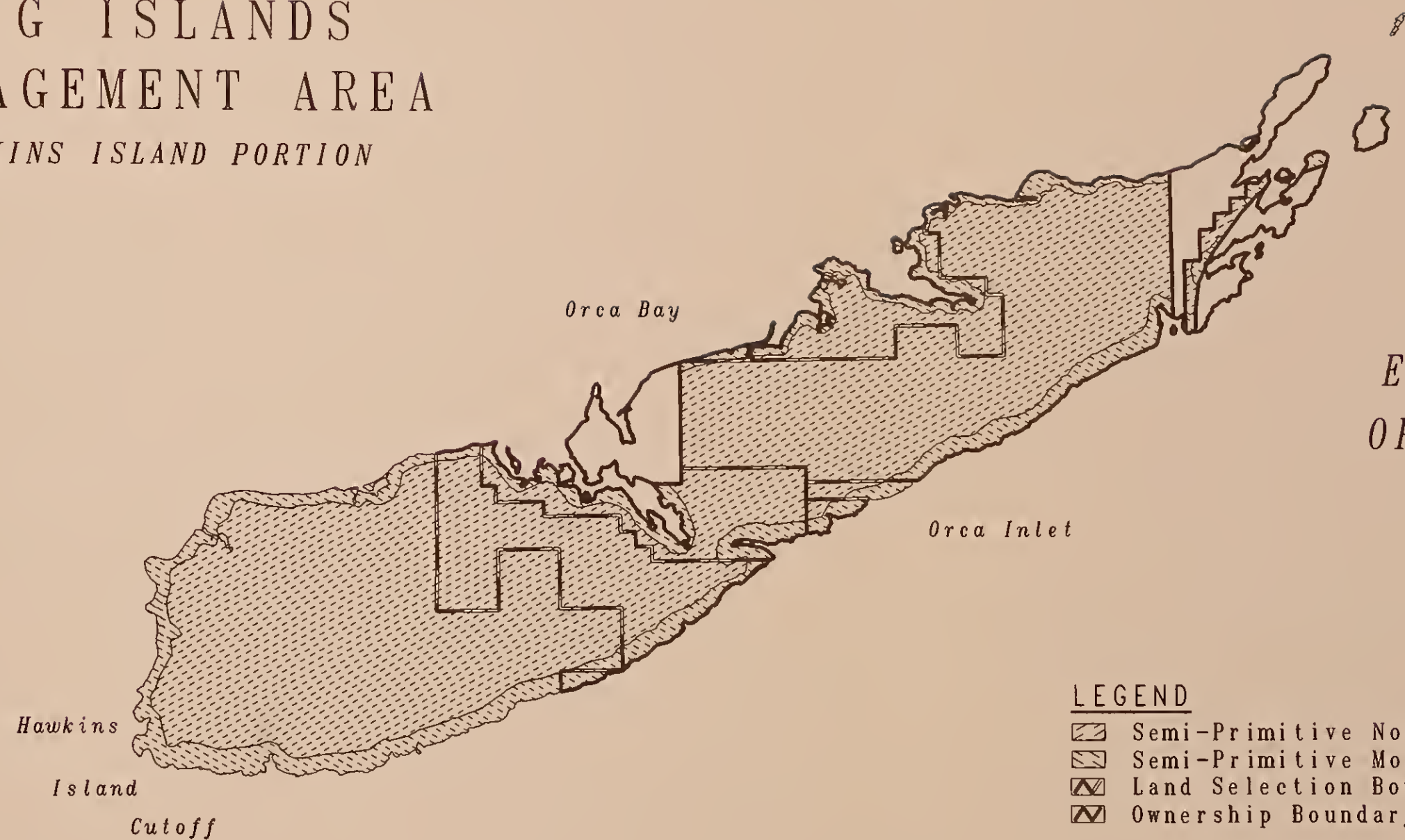




# DRAFT





## BIG ISLANDS MANAGEMENT AREA

*HAWKINS ISLAND PORTION*



*EXISTING RECREATION  
OPPORTUNITY SPECTRUM*

### LEGEND

-  Semi-Primitive Non-Motorized
-  Semi-Primitive Motorized
-  Land Selection Boundary
-  Ownership Boundary

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989

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# **Chapter 4**

## **Environmental Consequences**



# Chapter 4

## Environmental Consequences

This chapter discloses the environmental consequences of implementing the alternatives described in Chapter 2.

Environmental effects or impacts can be direct, indirect, or cumulative. The terms "effects" and "impacts" are used interchangeably. They can be quantitative or qualitative, short or long in duration, adverse or beneficial, real or potential.

Combinations of effects occurring over time can produce cumulative effects. Activities on adjacent lands in different ownerships must be taken into account. These activities, occurring in the same general location over a defined period of time, are incremental and can produce cumulative effects.

All past, present, and future resource management and the transportation system associated with this management were included in the cumulative effect analysis.

The assessment of effects assumes compliance with policies and standards established in the 1984 Chugach National Forest Land and Resource Management Plan (amended 1986), Regional standards, guidelines, and other policies, and Federal laws and National policies. Standards and Guidelines in the document are already incorporated in the analysis of the proposals and will apply to planning and management of the project area.

The analysis of cumulative effects of combined activities on National Forest and private land, assumes the private landowner will comply with the State Forest Practices Management Act.

Forest programs will continue to be monitored and evaluated. A monitoring plan was prepared in the Forest Plan as amended, and will be applied. This has been supplemented in this document as needed and will ensure compliance with Forest policies and standards and guidelines. Through the monitoring process, identification of research needs will be made to complement the monitoring plan.

## Special Uses

In all alternatives new special uses would be permitted consistent with the amended Forest Plan and Standards and Guidelines.

Opportunities for permitted uses would be greater in Alternatives 4, 5 and 6 (Maps L, M, and N) resulting from increased access on the south end of Montague Island. Additional recreation facilities in Alternative 5 would further increase opportunities for some types of special uses.

Alternatives 2-6 (Maps J, K, L, M, and N) would have both adverse and positive effects on the MacLeod Harbor Lodge operation. Alternative 5 would provide an opportunity



## **4 Environmental Consequences**

to expand the capacity and services at the MacLeod Harbor Lodge. The natural character of South Montague would be changed by resource development activities.

### **Outfitter/Guide Carrying Capacity Estimates**

The capacity determination is not a proposed action, but if any actions were implemented using this information as guidance, the effect would be to maintain the desired recreation experience as defined by the recreation opportunity spectrum (ROS) class. Since coordination with Alaska Department of Fish and Game is required, there should not be any adverse effects on fish and wildlife populations. The estimates of social carrying capacity do not vary by alternative because there is no additional capacity in areas where use increases are indicated. The current permitted operators would not experience any change as a result of the estimated capacity. The current use of the areas by the general public would not be changed.

### **Minerals**

All of the land managed by the Chugach National Forest within the Big Islands Management Area is available for mineral exploration and development in all alternatives under the Federal mining laws unless it is specifically withdrawn. The southeast portion of Green Island, Little Green Island and the Needles are the only areas that may be withdrawn if the area becomes a Research Natural Area (Map G). A withdrawal would make National Forest land unavailable for oil and gas leasing, and for exploration and development of common variety and locatable minerals.

The Potential Mineral Supply Analysis for the Big Islands Management Area completed by the Bureau of Mines and U.S. Geological Survey indicated that there is a relatively low potential for mineral discovery and development for locatable and leasable minerals, and no major activities are expected to occur. This would result in minor or no impacts to the land or other resources. The appropriate standards and guidelines will be used to regulate any exploration or development.

### **Access**

The effects of access on other resources are displayed and analyzed in the section addressing other issues.

Green, Little Green, The Needle, Hinchinbrook and Hawkins Islands will not be impacted by the development of roads and Log Transfer Facilities (LTF's).

This analysis discusses access projects on Montague Island only. The projects described for south Montague Island increase the number and type of recreation opportunities offered while maintaining existing areas of limited access in other parts of the management area.

All action alternatives make south Montague Island more accessible. All access projects provide increased opportunities for recreation, fish and wildlife and timber management. Improved access increases the opportunity for enhancement of fish and

wildlife habitat while maintaining habitat capability in other parts of the management area. Road access associated with this entry provides opportunities for long-term timber management.

Standards and guidelines applicable to access prevent or mitigate adverse impacts to all resources.

Access is improved by road and trail construction and by providing access to saltwater.

Anchor buoys would increase recreation use in Zaikof Bay for Alternatives 2 through 6 (Maps J, K, L, M and N) because boaters would have a safer site to stop and go onto the National Forest.

Recommendations from airstrip feasibility studies could increase air access (Maps J, K, L, M and N).

Saltwater access would be provided at MacLeod Harbor and San Juan Bay in Alternatives 3 through 6.

New trails would be provided near MacLeod Harbor, San Juan Bay and Jeanie Cove in Alternatives 3 through 6, Stump Lake in Alternative 2 through 6 and Patton Bay in Alternatives 4 through 6 (Maps J, K, L, M and N). Alternative 5 also proposes a motorized trail between MacLeod Harbor and the upper reaches of the Nellie Martin River drainage as well as a lateral ridge trail connecting San Juan Bay with the motorized trail.

Exact location and design of quarries and pits would be identified when the projects are implemented. At this stage the quantity, type and quality of rock available to develop projects is unknown. Pits and quarries would be located and designed according to the standards and guidelines to mitigate impacts to soil, water and visual quality. When opportunities are available, rockpits would be used for fish enhancement.

## Alternative 1 - No Action

This alternative maintains the roadless character of the area. There are no National Forest roads or LTFs proposed for construction. Chugach Alaska Corporation would not be permitted to develop a road across the National Forest. It would develop the land it owns at Patton Bay and MacLeod Harbor separately and solely within corporation boundaries with access from saltwater.

This alternative would require them to build an LTF in Patton Bay and in MacLeod Harbor.

## Roads for Alternatives 2 - 3

Under these alternatives, access is improved to National Forest lands between MacLeod Harbor and San Juan Bay while the balance of the area remains roadless (Maps J and K). However, Chugach Alaska Corporation (CAC) would not be permitted to develop a road across the National Forest. It would develop the land it owns at Patton Bay and MacLeod Harbor separately and solely within corporation boundaries with ac-



## **4 Environmental Consequences**

cess from saltwater. This alternative would require them to build an LTF in Patton Bay and in MacLeod Harbor.

The Forest's resources are developed independent of any action taken by CAC for road development and LTF. CAC and the Forest Service would not be coordinating management of roads and LTFs.

### **Roads for Alternatives 4 - 6**

The transportation system as described in Alternatives 4, 5 and 6 (Maps L, M and N) increases the amount of National Forest system lands on south Montague Island accessible to visitors (ranging from 70% - 85%). The rest of the management area remains roadless.

CAC and the Forest Service would develop a joint road system between Patton Bay and MacLeod Harbor to develop their respective resources. Alternative 6 arterial road route (34.8 miles) follows the alignment proposed by CAC. Alternatives 4 and 5 arterial alignment (34.5 miles) is similar to Alternative 6 for several segments. The arterial road route for Alternatives 4 and 5 provide more effective access for development of National Forest resources and still connect private land at Patton Bay and MacLeod Harbor.

Coordination in the use of one LTF in MacLeod Harbor would also occur.

Alternative 5 has the highest level of anticipated recreational and timber hauling traffic on the road system. The greatest potential conflict in traffic types will be on the arterial road from Patton Bay to MacLeod Harbor. Traffic levels will be monitored and, if conflicts arise, the management of the road will be reviewed and measures recommended to provide safe traffic patterns for all users.

### **Feasible LTF Sites**

Within the range of the activities proposed by this plan there are four feasible options for siting a LTF on Montague Island. Two are located on the west side in MacLeod Harbor. Two are located on the east side at Patton Bay. Other sites exist at the north end of Montague Island but the distance makes them impractical at this time.

There are two sites in MacLeod Harbor. North MacLeod Harbor is at the head of the harbor, on the north shore which is owned by Chugach Alaska Corporation. South MacLeod Harbor is located near the head of the harbor, on the south shore. This is land managed by Chugach National Forest.

There are two sites at Patton Bay. Box Point LTF site is at the north point at the mouth of the bay on land owned by Chugach Alaska Corporation. An unnamed point, called Wooded Island LTF site in this report, is at a point at the south end of the bay. The site is on the shore managed by Chugach National Forest.

The MacLeod Harbor sites had subsurface investigations completed with dives in June 1986 by ADF&G, NMFS and USF&WS. Investigations have not been done at the Box Point and Wooded Island sites.



The report for MacLeod Harbor states that the sites at South MacLeod (site #3) and North MacLeod (site #5) are the feasible sites. Salmon streams are near both sites, the lesser producing stream is near South MacLeod. South MacLeod has limited macro-biota associated with this site. South MacLeod will require more fill on the intertidal zone than North MacLeod and has currents which would tend to spread bark and wood debris. North MacLeod has a greater amount of marine vegetation and fauna on a steeper sloped bottom.

A discussion of the LTFs supporting the locations identified in the alternatives is available in the LTF chapter of the Transportation Plan for Montague Island. The dive report is found in Appendix D.

Uplands sort yard development would entail the removal of vegetation from approximately 10 acres, leveling, if necessary, and the placement of rock or gravel to provide a solid pad. The stabilized pad would reduce the displacement of the soil layer by equipment and reduce the level of sediment transport which would have to be trapped from water run-off in the storage area.

Off-shore rafting and storage would entail the placement of anchors and standing booms for holding bundles. There would not be subsurface disturbance, except for loose bark that would be dispersed by the current.

The four sites proposed for LTF's are all in locations visible from a wide range of view-points around Sensitivity Level 1 waterbodies. Because only two sites, the one on the south side of MacLeod and the Wooded Island location, are on National Forest System land, only those sites have identified VQO's.

Due to the open nature of the beach landscapes and because the land/water interface is typically a focal point of those landscapes, the LTF's would create prominent alterations of these landscapes. While LTF's would actually modify one to five acres, they would typically dominate about a 50 acre portion of the landscape and thereby convert those portions of the landscape to visual condition IV.

While the sites would vary somewhat in the exact number of acres that would actually be modified (Wooded Island would affect a larger area because of the long ramp and breakwater while the north MacLeod site, with its relatively short ramp, would likely impact the least area) and in the exact degree of the impacts (the A-frame option for the south side of MacLeod Harbor would involve a more prominent, higher profile landform and structure than typical of the other strategies), the number of sites that would be developed is the primary determinant of the visual resource consequences of LTF development.

If the Wooded Island site were developed as an option under one of the alternatives, it would also produce an obviously altered landscape that would not comply with the applicable Retention requirement to maintain a natural landscape.

LTFs and off-shore rafting areas would be constructed by the standards and guidelines.

### **LTF for Alternatives 2 and 3**

The LTF identified on the alternative maps J and K is the South MacLeod Harbor site. This site allows for the development of either a lift off entry device (i.e. bulkhead with an A-Frame or Crane) or a ramp/slide entry device. A ramp/slide entry device is proposed.

In Alternatives 2 and 3, three LTFs would be built and operated on Montague Island. The South MacLeod Harbor LTF would be built to transfer logs harvested from National Forest System lands. CAC would have to develop LTFs at Box Point in Patton Bay and on the north side of MacLeod Harbor in order to accommodate their timber harvesting.

CAC has conceptually designed a ramp/slide LTF at North MacLeod. South MacLeod Harbor and Box Point LTFs can be either a ramp/slide (proposed) or lift-off facility. Each site would need upland developed for sorting and dry storage of logs, which would require approximately 10 acres for each site. Each site would include an off-shore rafting and storage area. The off-shore area would be approximately 20 acres in size and in a minimum depth of 40 ft from Mean Lower Low Water (MLLW).

Upland sort yards would be developed adjacent to or close to the shoreline site area for LTFs. At both MacLeod Harbor sites the uplands area can be developed directly adjacent to the shoreline site. Box Point upland storage will need to use the area on the north side of the point a short distance from the LTF.

When implemented, these facilities may be modified to allow for barges to dock and load wood without placing them into the water. The greatest difference between barging and rafting are the amount of bark lost in the water and the cost of taking the logs to a milling point. Barging is lower in bark loss and higher in cost. Rafting may lose some logs during the tow to the Seward mill, the assumed mill point.

The south MacLeod LTF site associated with Alternatives in 2 and 3 would not comply with the VQO's adopted in the Forest Plan. Selection of this alternative would require an amendment to the Forest Plan.

### **LTF for Alternatives 4 through 6**

The proposed LTF is the North MacLeod Harbor site and is in private ownership. This site has good upland log storage possibility, though smaller than the South MacLeod Harbor site. The off-shore storage site quality is better than the South MacLeod Harbor site. Off-shore log raft building and storage is available with this site and has natural protection from the elements.

This site was previously used in the mid 70s. The site was investigated with the South MacLeod Harbor sites. If one of these alternatives is selected, it would be expected both private and Forest Service timber sales would be handled on the North MacLeod Harbor LTF.



The upland log storage area would be approximately 10 areas. The raft building and log storage area would be approximately 20 acres in size and in a minimum of 40 feet of water from MLLW.

The same uplands and off shore development at the North MacLeod site would be those utilized in all alternatives. There would be greater use in Alternatives 4 through 6 than in Alternatives 2 and 3. In Alternatives 4 through 6, South MacLeod and Box Point would not be developed as LTFs.

### **Cumulative Effects**

Chugach Alaska Corporation would build 56.2 miles of new road in their Patton Bay parcel. Approximately 1.0 mile of road would have to be either reconstructed or constructed in the MacLeod Harbor parcel.

Cumulative road construction on southern Montague Island would be 57.2 with Alternative 1, 95.8 miles with Alternative 2, 103.0 miles with Alternative 3, 114.8 with Alternative 4, 119.5 with Alternative 5, and 121.5 miles with Alternative 6.

Alternative 1 through 3 do not propose cooperative road system development. Alternative 4 through 6 propose 49.0 miles of cooperative road system development.

The transportation system as described in Alternatives 4, 5 and 6 significantly increases (ranging from 70% to 85%) the amount of accessible National Forest system lands on south Montague Island.

Alternatives 1 through 3 do not provide for cooperative use of LTFs. Chugach Alaska Corporation would develop two LTFs and offshore rafting and storage areas at Patton Bay and MacLeod Harbor. The Chugach National Forest would develop one LTF and offshore rafting and storage area in MacLeod Harbor. There would be two LTFs with Alternative 1 and three LTFs with Alternatives 2 and 3.

Alternatives 4 through 6 cooperatively manage and use one LTF and offshore rafting and storage area on private land in MacLeod Harbor.

Alternative 1 would create 105 acres in Future Visual Condition (FVC) IV (from LTF development on private land for timber harvesting). Alternatives 2 and 3 would create 160 acres and Alternatives 4 through 6 would modify 60 acres. Of those acres, only 50 acres in Alternatives 2 and 3 would be on National Forest land; the remainder would be located on private lands.

### **Wildlife and Fish**

The scoping process determined that the potential effects of management activities on wildlife and fish populations dependent on mature forested habitats, especially Sitka black-tailed deer and anadromous fish were of major concern. This section documents the effects of the proposed alternatives on wildlife and fish through the use of Management Indicator Species (MIS). The analysis examines the consequences of activities on Montague Island only. Actions proposed for this planning period, both private and



## 4 Environmental Consequences

Forest Service, are limited to Montague Island with the exception of a single Forest Service recreation cabin on Hinchinbrook Island. Wildlife and fish habitats on Hinchinbrook, Hawkins and Green Islands would be maintained in their current condition and would continue to provide habitat capability in addition to that displayed for each MIS in the following analyses.

### **The Relationship Between Habitat Capability and Species Populations**

The terms habitat capability and populations are usually not interchangeable. Habitat capability is synonymous with carrying capacity or the maximum number of individuals the habitat can support, whereas the population is the number of individuals actually present at a given time. Populations may temporarily exceed habitat capability. However, most populations are usually below what the habitat is capable of producing, due to winter mortality, predation or other ecological factors.

When mature forest is harvested, the habitat capability for species dependent on mature forest habitats will decline. If the population is near carrying capacity, the population will also decline. If the population is low, timber harvest may not affect the present population. However, as the population recovers, potential population growth will be reduced where timber harvest has occurred in critical winter habitats.

The Forest is currently working with state and other federal agencies having wildlife and fish management responsibilities to develop "desired population goals", but results are not yet available. Various factors, such as a need to maintain minimum viable populations and/or populations large enough to sustain public demand, both consumptive and nonconsumptive, need to be considered. Even with extensive timber harvest, it is possible that for some species habitat capability would be sufficient to maintain desired population levels and meet public demand. For others, habitat improvement projects may be necessary to meet these goals. The following analyses portray the consequences of implementation of the various alternatives using estimates of the changes in habitat capability for individual species.

### **Retention of Mature Forest**

Mature forest is characterized by the presence of large diameter trees, multi-layered canopies, a range of tree diameter sizes, and the presence of understory vegetation. These stands are generally well past the age of maturity as evidenced by dead and dying trees, snags and other down woody material. Mature forest, as used throughout the following analysis, is analogous to the mature to overmature sawtimber size class discussed in the timber section of Chapter 2 (Maps E and F).

The Interdisciplinary Planning Team (IDT) classified 885 acres of mature forest and 79 acres of second growth on south Montague Island for wildlife habitat retention under all action alternatives (Maps Q, R, S, T, and U). These areas were withdrawn from the suitable commercial forest timber base. The major impetus was to maintain important deer wintering habitats in close proximity to private lands where much of the deer winter habitat would be harvested. Additional beach fringe areas were also retained in

all action alternatives. The IDT did not consider wildlife habitat retention outside of the area proposed for timber harvest during this planning period.

In addition to wildlife habitat retention areas, additional mature forest habitats would be maintained on National Forest lands on Montague Island through the end of the rotation, in lands classified as follows (Maps E and F):

1. Unsuitable or inoperable commercial forest land (9,000 acres)
2. Unproductive forest land (65,000 acres)
3. Commercial forest in riparian areas not scheduled for harvest in this entry as a result of the Management Area Standards and Guidelines (Appendix F).

The action alternatives specify that between 2,428 and 1,235 acres of mature forest land on Montague Island (1,384 to 191 acres, south Montague) would be managed to allow timber harvest but maintenance of wildlife habitat values would be emphasized (Wildlife-Visual/Timber Prescription, Maps Q, R, S, T, U and V).

Approximately 100 acres of mature commercial forest and 1000 acres of unproductive forest are present on State selected lands. No harvest is expected to occur during the planning period.

### **Previous Timber Harvest**

Approximately 2000 acres of timber were harvested on Montague Island between 1947 and 1973. Clearcuts ranged in size from 4 to 305 acres. The following analyses portray all previous harvest as second growth stands. An additional 1000 acres on Montague Island are classified as second growth due to the loss of mature trees from blowdown or the 1964 earthquake (Maps E and F).

### **Timber Harvest on Private Lands**

Estimates of the cumulative effects of private timber harvest activities on wildlife and fish species on Montague Island were made based on the following information provided by Chugach Alaska Corporation (CAC). Harvest unit boundaries had not been delineated and road locations were tentative.

1. All harvest would be completed within 10 years.
2. A total of 150 mmbf of timber would be harvested in the Patton Bay/Beach River area. Timber would be harvested in the Macleod Harbor Area.
3. No harvest would occur within 50 feet of the stream on the National Forest trail easement along Beach River. Much of the timber near the uncataloged stream emptying into Patton Bay would not be harvested. No timber would be harvested on the Box Point peninsula.
4. A map was provided that delineated the tentative road network for timber harvest activities in the Patton Bay/Beach River area. Temporary roads were not included.



5. No road map was provided for the Macleod Harbor area.

Based on the above information the IDT developed a map delineating expected private land harvest areas for estimation of effects. The analysis assumes the following:

1. A total of 4870 acres of timber (150 mmbf) would be harvested in the Patton Bay/Beach River area by 1999.

2. Approximately 586 acres (12 mmbf) of timber would be harvested in the Macleod Harbor area by 1999.

3. A total of 2810 acres of timber would be harvested in Stream Habitat Zones (Appendix E).

4. All timber adjacent to streams within the estimated unit boundaries would be harvested, with the exception of the buffer along the National Forest trail easement on Beach River.

5. Analysis of effects of roading in the Patton Bay/Beach River area was based on the map provided by CAC. Effects of roading in the Macleod Harbor area were limited to the proposed arterial road.

6. Based on Forest Service timber classifications, a total of 1273 acres of commercial forest land and 5689 acres of unproductive forest land would not be harvested.

### Management Indicator Species

MIS are wildlife and fish species of special concern or those representing special habitats (Chapter 3). The effects of management activities are measured through estimated changes in habitat capability, using the most important habitat components for each MIS. Existing population levels for the MIS in the Big Island Management Area are not available. Definitions of the wildlife and fish habitats used in this analysis are described in the following sections for each individual MIS. Habitats used for analysis for a given MIS may overlap with habitats defined for others.

For each MIS, effects analyses were performed for activities: 1) occurring from 1947 to the present on Montague Island, 2) scheduled to occur between the present and 1999 on National Forest lands on Montague Island, 3) scheduled to occur between the present and 1999 on National Forest lands and adjacent privately owned lands on Montague Island and 4) assumed to occur on Montague Island by the end of the timber rotation.

The long-term effects analysis portrays the effects of harvesting all the suitable mature commercial forest on Montague Island (Maps E and F). This assumption is very tentative and subject to modification at the next Forest Plan revision. The suitability determination did not consider retention of mature commercial forest for other resource concerns outside of the south Montague project area. In addition, much of timber estimated to be harvested in riparian areas would be retained through compliance with the Management Area Wide Standards and Guidelines for timber harvest in riparian



areas. This projection is used to display cumulative impacts to wildlife and fish populations from potential future harvest activities.

### **Fisheries**

This analysis describes the impacts on anadromous fish habitat from implementing the various alternatives. Because resident sportfish occupy essentially the same habitat as anadromous fish, with the exception of isolated lakes, the impacts to resident fish habitat are assumed to be similar. For this analysis, all B,C,D, and E stream channel types on identified streams were considered to be anadromous habitat (Appendix E). The Alaska Department of Fish and Game, in cooperation with the Chugach National Forest, surveyed the streams on south Montague in the fall of 1988 verifying the presence or absence of anadromous fish. Potential enhancement opportunities were also identified. In addition, Chugach National Forest personnel intensively surveyed portions of the Nellie Martin River and San Juan River Stream Habitat Zones in the summer of 1988 to identify areas containing braided channel fish habitat. The results of these surveys were used in this analysis. Reports are on file in the Supervisor's Office of the Chugach National Forest.

### **Stream Priority**

Each of the identified fish streams in the planning area were categorized as being of very high importance (Priority 1), high importance (Priority 2), or moderate to low importance (Priority 3) based on the historical pink and/or chum salmon escapements, the sportfishing potential of the system, the presence or absence of large structural fisheries enhancement projects, and the stream's status as an ADF&G index stream (Maps A and B). These criteria are further explained in Appendix E. Although each fish stream in the planning area is important in contributing to the wild stock salmon production, in maintaining stock diversity, and in supplementing production when individual streams have poor production because of biological or climatological factors, it is assumed that impacts to fish habitat on Priority 1 streams would have a greater overall effect to the aquatic habitat capability within the planning area than the same impact on a Priority 2 or 3 stream.

### **Aquatic Habitat Management Units**

Aquatic Habitat Management Units (AHMU) are the specific land areas which will be managed to protect riparian values and fish habitat. The size and location of an AHMU is a function of stream channel type, stream class, adjacent landforms, soils information, and the fish species present. At a minimum, AHMUs include the area 100 feet on either side of perennial streams, lakes, and other bodies of water. They also include adjacent areas which substantially influence the riparian zone or which have the potential to adversely effect aquatic habitat. Delineation of the AHMU boundaries in proposed project areas will require on the ground assessments, including a more detailed channel type classification, prior to project implementation. Some minor changes in harvest unit and road locations may be necessary to comply with direction provided by the Management Area Wide Standards and Guidelines. These standards and guidelines provide for the maintenance of instream and streamside cover, streambank stability, large woody debris and fish passage for all fish streams. They also provide direction which emphasizes minimizing sediment input into streams. Management direction is

much more restrictive for AHMUs where anadromous fish are present (Class I streams, Appendix F).

## **Stream Habitat Zones**

Stream habitat zones (SHZ) are used as an analysis tool to identify the general areas where there is a high likelihood of encountering anadromous fish habitat. The SHZ were defined by a combination of stream channel type and landtype information. They include all of the Alluvial Fan, Low Outwash Plain, Braided Stream, and High Outwash Plain landtypes which lie adjacent to identified anadromous streams. These landtypes often cover broad areas and include many of the small braided channel fish streams which have not been documented and which are too small to be identified on planning maps. Where none of the designated landtypes were immediately adjacent to a stream or interconnected lake, a 100 foot strip on each side of the stream and lake was included in the SHZ (Maps A and B). Appendix E explains how the SHZ were developed in more detail.

The SHZ is assumed to include the majority of the anadromous and resident (Class I & II) Aquatic Habitat Management Units (AHMU). However, the SHZ undoubtedly contains areas with no fish habitat or areas with only small populations of resident fish. They generally do not include Class III AHMUs (Appendix F). Management activities occurring within the SHZ are assumed to have a greater potential for impacts on fish habitat than activities occurring outside this zone.

## **General Effects of Timber Harvest**

The natural development of fisheries habitat is a complex and dynamic process resulting from the long-term influence of geology, landform, climate and vegetation patterns. Disruptions of the natural state of this process by timber harvest or natural events can cause site specific or watershed specific effects on fisheries habitat and water quality. Potential effects include reductions in streambank and stream channel stability, increased sedimentation, alterations in instream and streamside cover, and changes in water temperatures (Gibbons 1982; Chamberlain 1982; Hartman and Holtby 1982; Elliott 1985; Schwan et al. 1985). The magnitude of these impacts are directly related to the design of individual harvest units, the intensity of harvest within the watershed, and site specific management practices.

Changes in the quality or quantity of spawning habitat have the greatest potential to effect the capability of streams to produce pink salmon. Large amounts of sediment in spawning gravels decrease the survival of salmon from eggs to fry and decrease the ability of the fry to emerge from the gravels. Adverse impacts can occur if timber harvest reduces streambank stability and causes an increase in sedimentation. Removing large woody debris (LWD) from streams, either as a direct result of timber harvest activities or as a result of removing the future sources of LWD along streambanks reduces the stability and quality of the available spawning areas.

Modifications of instream cover, especially within small rearing tributaries, has the greatest potential for effecting coho salmon habitat capability. A reduction in undercut banks and other high quality rearing habitat can occur where timber is felled and



yarded across streamcourses without full suspension. The loss of large woody debris from streamside timber harvest or extensive instream cleanup reduces both the amount of instream cover and high quality pool habitat. Even when instream cover characteristics are maintained during timber harvest, the removal of streamside timber can reduce LWD over the long term as the existing woody debris decays without being replaced. An abundance of large woody debris has been demonstrated to be a critical factor in natural coho production. (Sedell and Swanson 1984; Heifetz et al. 1986).

Habitat capability for cutthroat trout can be affected by changes in both spawning and rearing habitat in the small tributaries and the upper reaches of anadromous habitat. Because of their size, these streams are particularly susceptible to reduced streambank stability and loss of instream cover.

Potential impacts to fish habitat capability would be avoided or reduced through the application of the standards and guidelines for timber harvest in riparian areas. Standards and guidelines control the quantity and method of management activities within riparian areas. They guide land management practices which have the potential to cause sedimentation of streamcourses. They emphasize the maintenance of instream cover characteristics and streambank stability. They also provide for the long term maintenance of large woody debris in streams. The Big Islands Management Area Wide Standards and Guidelines for timber harvest in riparian areas are found in Appendix F. Mitigation measures specific to the proposed harvest units for all alternatives are displayed in Chapter 2 (Tables 2-3a-2-8)

### **Short Term Effects of Timber Harvest**

Six parameters are used to evaluate the potential impacts of the various alternatives to fish and fish habitat. They include: 1) the total miles of harvest near streamside; 2) the miles of harvest near streams within the Stream Habitat Zones (SHZ; see Maps A and B); 3) the total acres of proposed harvest within watersheds; 4) the acres of harvest within the SHZ; 5) the number of watersheds effected and their relative importance; 6) a subjective rating that estimates the potential for site specific impacts of individual harvest units on fish habitat (Appendix E).

The analysis of harvest near streams does not mean streambank harvest. The Management Area Wide Standards and Guidelines provide for the maintenance of streamside vegetation and actual harvest to the streambank would be rare (Appendix F). The miles of streamside harvest displayed in the following analysis is equal to the sum of the miles of harvest near each side of the stream.

**Alternative 1 (No Action)** - The habitat capability to produce pink salmon, coho salmon, and cutthroat trout would remain unchanged.

**Alternative 2** - Harvest would occur within the San Juan River (Priority 1), two Priority 2, and three Priority 3 watersheds. No land disturbing activities would occur within the Priority 1 Nellie Martin River drainage. Harvest would be oriented away from Stream Habitat Zones (SHZ) and especially away from the San Juan River SHZ (Maps A, B, and K).



## 4 Environmental Consequences

This alternative proposes the least harvest near streams and within SHZs of any of the five action alternatives (Table 4-1). Timber harvest would occur near approximately 2 miles of streamside. Harvest near streams in the SHZ would be somewhat less. Harvest to the streambank would not occur along anadromous streams. A total of fifty-four acres would be harvested within SHZs. Only 12 acres would be harvested within the San Juan River Priority 1 SHZ (Table 4-2a-2b).

Unit 31 in the San Juan drainage has a moderate/high rating for potential impacts to fish habitat. Mitigation measures are discussed in Chapter 2.

With the small amount of previous harvest in the project area, the relatively small amount of proposed timber harvest, especially within Stream Habitat Zones, and only one unit with a moderate/high potential to alter aquatic habitat, the timber harvest proposed under Alternative 2 would not be expected to impact populations of any MIS or to effect the aquatic habitat capability within any of the stream systems.

Alternative 3 - Harvest would occur within the San Juan River drainage (Priority 1), two Priority 2, and three Priority 3 watersheds. No land disturbing activities would occur within the Nellie Martin River watershed. Harvest would be emphasized within the San Juan drainage (Maps A, B, and K).

Timber harvest would occur near 7 miles of stream. Five miles of harvest would occur near streams within the Stream Habitat Zone (SHZ; Table 4-1). Complete harvest to the streambank would not occur along any anadromous streams. One-hundred and seventy-three acres would be harvested within Stream Habitat Zones. The majority of this, 139 acres, would be harvested within the San Juan River Priority 1 SHZ (Table 4-2a-2b). This would represent approximately 9 percent of the SHZ and 10 percent of the area near the anadromous portion of the stream.

Five units with a moderate/high rating for potential impact to fish habitat would be harvested. They include units 24, 27, 28, 29 and 36. Each of these would occur within the San Juan River SHZ (Table 4-1).

Because of the emphasis on timber harvest within the San Juan drainage in alternative 3, the potential for adverse effects within this Priority 1 drainage would be greater than for any other action alternative. Mitigation measures for individual harvest units, described in Chapter 2 (Tables 2-3a-2-8), would reduce potential impacts to a level where observable changes in the populations of PMIS or aquatic habitat capability would not occur.

Alternative 4 - Harvest would occur within both the Priority 1 San Juan River and Nellie Martin River watersheds, although harvest within the Nellie Martin River watershed would be minimal (24 acres). Harvest would also occur in two Priority 2 and nine Priority 3 watersheds. In general, proposed timber harvest would be oriented away from Priority 1 watersheds, and especially away from Priority 1 Stream Habitat Zones (SHZ). Harvest would be emphasized in the lesser important Priority 3 drainages (Maps A, B, and L).

#### 4-1 Indices of the effects to fisheries habitat from proposed timber harvest activities.

|  | Alternative<br>1 | Alternative<br>2 | Alternative<br>3 | Alternative<br>4 | Alternative<br>5 | Alternative<br>6 | Proposed<br>Private<br>Harvest |
|--|------------------|------------------|------------------|------------------|------------------|------------------|--------------------------------|
| <b>Total Miles of Harvest *</b>                                  |                  |                  |                  |                  |                  |                  |                                |
| <b>Near Stream Sides</b>   |                  |                  |                  |                  |                  |                  |                                |
| Priority 1 Streams   | 0                | < 1              | 6                | 2                | 4                | 3                | 27                             |
| Priority 2 Streams   | 0                | 1                | 1                | 1                | 1                | 1                | 4                              |
| Priority 3 Streams   | 0                | 0                | 0                | 4                | 3                | 4                | 5                              |
| <b>Miles of Harvest Near Stream Sides in SHZ *</b>               |                  |                  |                  |                  |                  |                  |                                |
| Priority 1 Streams   | 0                | < 1              | 4                | < 1              | 3                | 3                | 26                             |
| Priority 2 Streams   | 0                | < 1              | < 1              | < 1              | < 1              | < 1              | 3                              |
| Priority 3 Streams   | 0                | 0                | 0                | 5                | 3                | 4                | 2                              |
| <b>Acres Harvested within Watershed</b>                          |                  |                  |                  |                  |                  |                  |                                |
| Priority 1 Streams   | 0                | 278              | 530              | 341              | 544              | 615              | 3970                           |
| Priority 2 Streams   | 0                | 161              | 120              | 67               | 54               | 54               | 370                            |
| Priority 3 Streams   | 0                | 0                | 0                | 351              | 383              | 339              | 310                            |
| <b>Acres Harvested within SHZ</b>                                |                  |                  |                  |                  |                  |                  |                                |
| Priority 1 Streams   | 0                | 12               | 139              | 8                | 184              | 196              | 2650                           |
| Priority 2 Streams   | 0                | 31               | 27               | 20               | 15               | 15               | 150                            |
| Priority 3 Streams   | 0                | 11               | 7                | 204              | 202              | 164              | 10                             |
| <b>Number of Harvest Units with Potential Effect Ratings of:</b> |                  |                  |                  |                  |                  |                  |                                |
| 0 = no effect  | N/A              | 20               | 22               | 11               | 12               | 15               |                                |
| 1 = low  | N/A              | 7                | 7                | 5                | 4                | 3                |                                |
| 2 = low/moderate   | N/A              | 5                | 4                | 7                | 6                | 4                |                                |
| 3 = moderate/high  | N/A              | 1                | 5                | 4                | 10               | 10               |                                |
| 4 = high   | N/A              | 0                | 0                | 0                | 0                | 0                |                                |

\* Does not mean harvest to the streambank, see Appendix F. Miles of harvest is equal to the sum of the miles of harvest near each side of the stream.

## 4-2a Indices of the effects to fisheries habitat in major watersheds from proposed timber harvest

|   | MacLeod Cr<br>#17070 | Nellie<br>Martin R.<br>#17790 | San Juan R.<br>#17000 | Beach Cr.<br>#17780 | Strike Cr.<br>#17870 | Deception<br>Creek<br>#17880 | Unnamed<br>#17837 |
|---|----------------------|-------------------------------|-----------------------|---------------------|----------------------|------------------------------|-------------------|
| Total Streamside Miles                    | 27                   | 112                           | 60                    | 46                  | 13                   | 7                            | 12                |
| Miles of Harvest Near Streamside *        |                      |                               |                       |                     |                      |                              |                   |
| Previous Harvest                          | 0                    | 1                             | 1                     | 0                   | 0                    | 0                            | 0                 |
| Proposed Private Harvest                  | 4                    | 13                            | 0                     | 15                  | 0                    | 0                            | 0                 |
| Alternative 1                             | 0                    | 0                             | 0                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 2                             | 1                    | 0                             | 1                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 3                             | 1                    | 0                             | 6                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 4                             | 1                    | 0                             | 2                     | 0                   | 3                    | 1                            | 1                 |
| Alternative 5                             | 1                    | 1                             | 4                     | 0                   | 1                    | 1                            | 1                 |
| Alternative 6                             | 1                    | 1                             | 2                     | 0                   | 3                    | 1                            | 1                 |
| Streamside Miles in SHZ                   | 21                   | 89                            | 41                    | 30                  | 11                   | 5                            | 9                 |
| Miles Available CFL                       | 4                    | 25                            | 17                    | 15                  | 8                    | 3                            | 5                 |
| Miles Suitable CFL                        | 4                    | 14                            | 11                    | 14                  | 7                    | 1                            | 4                 |
| Miles of Harvest Near Streamside in SHZ * |                      |                               |                       |                     |                      |                              |                   |
| Previous Harvest                          | 0                    | 1                             | 1                     | 0                   | 0                    | 0                            | 0                 |
| Proposed Private Harvest                  | 3                    | 12                            | 0                     | 14                  | 0                    | 0                            | 0                 |
| Alternative 1                             | 0                    | 0                             | 0                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 2                             | <1                   | 0                             | <1                    | 0                   | 0                    | 0                            | 0                 |
| Alternative 3                             | <1                   | 0                             | 4                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 4                             | <1                   | 0                             | <1                    | 0                   | 3                    | <1                           | 1                 |
| Alternative 5                             | <1                   | 1                             | 2                     | 0                   | 2                    | <1                           | 1                 |
| Alternative 6                             | <1                   | 1                             | 2                     | 0                   | 3                    | <1                           | <1                |

\* Does not mean harvest to the streambank, see Appendix E. Miles of harvest is equal to the sum of the miles of harvest near each side of the stream.



# 4-2b Indices of the effects to fisheries habitat in major watersheds from proposed timber harvest

|   | MacLeod Cr.<br>#17070 | Nellie<br>Martin R.<br>#17790 | San Juan R.<br>#17000 | Beach Cr.<br>#17780 | Strike Cr.<br>#17870 | Deception<br>Creek<br>#17880 | Unnamed<br>#17837 |
|---|-----------------------|-------------------------------|-----------------------|---------------------|----------------------|------------------------------|-------------------|
| Acres of Harvest within<br>the Watershed            |                       |                               |                       |                     |                      |                              |                   |
| Previous Harvest                                    | 50                    | 30                            | 120                   | 20                  | 0                    | 0                            | 0                 |
| Proposed Private Harvest                            | 154                   | 1000                          | 0                     | 1908                | 0                    | 0                            | 0                 |
| Alternative 1                                       | 0                     | 0                             | 0                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 2                                       | 161                   | 0                             | 278                   | 0                   | 0                    | 0                            | 0                 |
| Alternative 3                                       | 38                    | 0                             | 530                   | 0                   | 0                    | 0                            | 0                 |
| Alternative 4                                       | 67                    | 0                             | 317                   | 0                   | 152                  | 85                           | 114               |
| Alternative 5                                       | 54                    | 114                           | 430                   | 0                   | 184                  | 85                           | 114               |
| Alternative 6                                       | 54                    | 282                           | 333                   | 0                   | 203                  | 85                           | 52                |
| Total Acres within SHZ                              | 892                   | 3531                          | 1554                  | 2726                | 295                  | 66                           | 318               |
| Available CFL                                       | 184                   | 1531                          | 436                   | 1765                | 227                  | 60                           | 193               |
| Suitable CFL  | 169                   | 1204                          | 351                   | 1648                | 201                  | 18                           | 180               |
| Acres of Harvest within SHZ                         |                       |                               |                       |                     |                      |                              |                   |
| Previous Harvest                                    | 0                     | 145                           | 13                    | 36                  | 0                    | 0                            | 0                 |
| Proposed Private Harvest                            | 154                   | 1000                          | 0                     | 1648                | 0                    | 0                            | 0                 |
| Alternative 1                                       | 0                     | 0                             | 0                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 2                                       | 15                    | 0                             | 12                    | 0                   | 0                    | 0                            | 0                 |
| Alternative 3                                       | 15                    | 0                             | 139                   | 0                   | 0                    | 0                            | 0                 |
| Alternative 4                                       | 15                    | 0                             | 8                     | 0                   | 103                  | 8                            | 90                |
| Alternative 5                                       | 12                    | 78                            | 106                   | 0                   | 102                  | 8                            | 90                |
| Alternative 6                                       | 12                    | 90                            | 106                   | 0                   | 97                   | 8                            | 36                |
| Number of Units with a<br>Moderate/High Rating (3s) |                       |                               |                       |                     |                      |                              |                   |
| Alternative 1                                       | N/A                   | N/A                           | N/A                   | N/A                 | N/A                  | N/A                          | N/A               |
| Alternative 2                                       | 0                     | 0                             | 0                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 3                                       | 0                     | 0                             | 4                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 4                                       | 0                     | 0                             | 1                     | 0                   | 1                    | 1                            | 1                 |
| Alternative 5                                       | 0                     | 2                             | 3                     | 0                   | 2                    | 1                            | 1                 |
| Alternative 6                                       | 0                     | 2                             | 3                     | 0                   | 2                    | 1                            | 1                 |

## 4 Environmental Consequences

Timber management would occur near 7 miles of stream with 6 miles of harvest near anadromous streams within SHZs. Only one mile harvest would be near a Priority 1 stream (Table 4-1). Complete harvest to the streambank would not occur along any anadromous stream. Two-hundred and thirty-two acres would be harvested within SHZs. Only 8 acres would be harvested within the San Juan River Priority 1 SHZ and no harvest would occur with the Priority 1 Nellie Martin River SHZ. Two-hundred and four acres would be harvested within Priority 3 SHZs, primarily within the Deception Creek, Strike Creek and Stream #17837 watersheds (Tables 4-1, 4-2a-2b). Timber harvest would occur near 27, 20, and 11 percent of the anadromous streambanks and 35, 12 and 28 percent of the SHZ would be harvested for Strike Creek, Deception Creek, and Stream #17837, respectively (Table 4-2a-2b).

Four units with a moderate/high potential for altering aquatic habitat would be harvested. Unit 8 within the San Juan River Priority 1 watershed, units 19, 16 and 26 within the Priority 3 Strike Creek, Deception Creek, and Stream #17837 watersheds, respectively. Mitigation measures for specific harvest units are discussed in Chapter 2 (Tables 2-3a-2-8).

With the minimal amount of harvest near anadromous streamsides in Priority 1 watersheds, the almost total lack of harvest within the Stream Habitat Zones of these streams, and only one unit (Unit 8) with a moderate/high potential to alter habitat, it is highly unlikely that the proposed timber harvest under Alternative 4 would cause any changes in the populations of MIS or in the aquatic habitat capability within the San Juan River watershed.

This level of harvest within the three major priority 3 watersheds would cause a short term increase in the amount of sediment entering these streams, especially within Strike Creek and Stream #17837. The amount of sedimentation would drop back to pre-project levels as harvest was completed and ground cover was reestablished. Because of the large natural fluctuations in anadromous fish population levels and the large flow fluctuations and high flushing rates in the affected streamcourses, the increased sedimentation from the proposed timber harvest would not cause any observable change in MIS populations or in aquatic habitat capability within the Strike Creek, Deception Creek, or Stream #17837

Alternatives 5 and 6 - Harvest would occur in the San Juan River, the Nellie Martin River, two Priority 2 streams, and nine Priority 3 watersheds (Maps A, B, M, and N).

Timber management would occur near 8 miles of stream under both Alternative 5 and Alternative 6. From seven to eight miles of harvest would occur near streams in the Stream Habitat Zones (SHZ), three miles of which would be within Priority 1 stream systems (Table 4-1). Complete harvest to the streambank would not occur along any anadromous streams. Between 184 and 196 acres (less than 1 percent of each SHZ) would be harvested within the Nellie Martin River and San Juan River Priority 1 SHZs. Between 164 and 202 acres would be harvested within Priority 3 SHZs, primarily within the Deception Creek, Strike Creek and Stream #17837 drainages (Tables 4-1, 4-2a-2b). The percent harvest near anadromous streambanks and the percent of the SHZ har-



vested for Deception Creek, Strike Creek, and Stream #17837 are similar to Alternative 4 (Table 4-2a-2b).

Ten units with a moderate/high potential to adversely alter aquatic habitat would be harvested. Four units would occur within the San Juan River Priority 1 SHZ (Units 7, 10, 11 and 16). Two units would be harvested within the Nellie Martin River Priority 1 SHZ (Units 31 and 32). Two moderate/high potential risk units would be harvested within the Strike Creek SHZ (Units 20 and 23) and one unit would occur in each of the Deception Creek (Unit 19) and Stream #17837 (Unit 29) drainages. These are Priority 3 stream systems. The mitigation measures for individual harvest units are discussed in Chapter 2 (Table 2-3a-2-8).

Alternative 5 and Alternative 6 would have the greatest potential to adversely effecting the habitat capability for pink salmon, coho salmon, and cutthroat trout of any of the action alternatives (Table 4-1). However, with the large size of the San Juan River and Nellie Martin River watersheds, and the relatively small percentage of harvest near anadromous streamsides and within the Stream Habitat Zones of these streams, the proposed timber harvest under Alternatives 5 or 6 would be unlikely to cause any observable changes in the populations of MIS or in the aquatic habitat capability within the San Juan River or Nellie Martin River watersheds.

The level of harvest proposed in the three major Priority 3 watersheds would cause a short term increase in the amount of sediment entering these streams, especially within Strike Creek and Stream #17837. The amount of sedimentation would drop back to pre-project levels as harvest was completed and ground cover is reestablished. Because of the large natural fluctuations in anadromous fish population levels and the large flow fluctuations and high flushing rates in the affected streamcourses, the increased sedimentation from the proposed timber harvest would be unlikely to cause any observable change in MIS populations or in aquatic habitat capability within the Strike Creek, Deception Creek, or Stream #17837

### **Effects of Forest Roding**

Roads can affect fish habitat through increasing sedimentation, altering stream channel flows, reducing the amount of spawning and rearing habitat, and creating migration barriers for both adult and juvenile fish. The degree of impact is dependant on individual road design, management practices used to implement the project, roading density within the watershed and vehicle use.

The habitat capability of streams to produce pink salmon depends on the quality and quantity of spawning habitat. Road construction activities and road drainage can result in increased sedimentation and reduced quality of spawning habitat. This may be less of a factor on Montague Island than in other areas because extremely heavy rainfall would tends to flush the additional sediment out of the system quite rapidly. Stream crossing structures, except bridges and open bottomed arches, can reduce the amount of spawning area available to pink salmon. On Montague Island, spawning habitat for pink salmon is considered limiting and is commonly confined to the lower reaches of streams in the upper intertidal zone. Reductions in the survival of pink sal-



mon from eggs to fry can be caused by operating machinery in the streambed or disturbing the streambed during the period when the eggs and fry are in the gravels.

Habitat capability for coho salmon is reduced when stream crossing structures create migration barriers for rearing juveniles. Both upstream and downstream migrations of juvenile coho are critical for optimum utilization of rearing habitat. Because of their small size, any stream crossing structure which creates a vertical drop or substantially increases the water velocity has the potential to cause a migration barrier and restrict access to upstream habitat. Cutthroat trout can also be effected by stream crossing structures that create migration barriers. Because cutthroat trout generally spawn in small tributaries and in the upper reaches of anadromous habitat, this species is particularly susceptible to culverts forming migration barriers.

Potential impacts to fish habitat capability would be avoided or reduced through the application of standards and guidelines for road construction in riparian areas. Standards and guidelines control the quantity and methods of management activities within riparian areas. They guide management practices which have the potential to cause sedimentation in streamcourses or to cause major losses to salmon eggs and premergent fry. They also specify fish passage requirements for all fish streams. The Big Islands Management Areawide Standards and Guidelines for roading are found in Appendix F. Specific mitigation measures for roading under all alternatives are displayed in Chapter 2.

### **Short Term Effects of Forest Roading**

Five parameters are used to evaluate the potential impacts of forest road development to fish and fish habitat under the various alternatives. They include: 1) the total miles of proposed road; 2) the miles of road proposed within Stream Habitat Zones (SHZ); 3) the total number of road crossings; 4) the number of road crossings within SHZs; and 5) the number of watersheds affected and their relative importance (Appendix E).

The above parameters are summarized in the sections for each individual alternative on the following page. A discussion of the consequences to fish habitat capability under each alternative follows in the section common to alternatives 2 - 6.

**Alternative 1 (No Action)** - The habitat capability to produce pink salmon, coho salmon, and cutthroat trout would remain unaffected from roading.

**Alternative 2** - This alternative proposes the fewest miles of road construction and stream crossings of any of the action alternatives (Table 4-3). Approximately 32 miles of permanent and temporary roads would be constructed from MacLeod Harbor to San Juan River (Map J). The San Juan River, two Priority 2 streams and three Priority 3 streams would be crossed or would have roads constructed within the watersheds. No land-disturbing activities would occur within the Nellie Martin drainage. Only 3 miles would be constructed within Stream Habitat Zones (Table 4-3). One mile would be constructed within the San Juan River Stream Habitat SHZ.

At least 19 stream crossing structures would be required. Eleven of these would occur in anadromous habitat within the San Juan River SHZ (Table 4-3).

Alternative 3 - Approximately 38 miles of permanent and temporary roads would be constructed from Macleod Harbor to San Juan River (Table 4-3; Map K). The San Juan River, two Priority 2 streams and three Priority 3 streams would be crossed or would have roads constructed within the watersheds. No land disturbing activity would occur within the Nellie Martin drainage.

Four miles of road would be constructed within Stream Habitat Zones, two miles of this would occur within the San Juan River Priority 1 SHZ (Tables 4-3, 4-4).

At least 23 stream crossings would be required. Fifteen would be in anadromous habitat within the San Juan River SHZ (Table 4-3).

Alternative 4 - Approximately 55 miles of permanent and temporary roads would be constructed from Macleod Harbor to Nellie Martin River (Table 4-3; Map L). The San Juan River, Nellie Martin River, two Priority 2 streams and nine Priority 3 streams would be crossed or would have roads constructed within the watersheds.

Approximately 11 miles of road would be constructed within Stream Habitat Zones, but the amount of road construction within Priority 1 SHZ would be relatively small. Only three miles would be constructed within the San Juan or Nellie Martin SHZs (Tables 4-3, 4-4).

At least 24 stream crossing structures would be required. Ten of these would occur in anadromous habitat within Priority 1 SHZ (Table 4-3).

Alternatives 5 and 6 - Approximately 60 miles of permanent and temporary roads would be constructed from Macleod Harbor to Nellie Martin River (Table 4-3; Maps M and N). The San Juan River, Nellie Martin River, two Priority 2 streams and nine Priority 3 streams would be crossed or would have roads constructed within the watersheds.

4-3 Indices of the effects to fisheries habitat from proposed forest roading.

|  | Alternative<br>1 | Alternative<br>2 | Alternative<br>3 | Alternative<br>4 | Alternative<br>5 | Alternative<br>6 | Private<br>lands<br>Proposal |
|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------------------|
| Total Miles of Forest<br>Road Development      | 0                | 32               | 38               | 55               | 58               | 60               | 52*                          |
| Miles of Forest Road<br>Development within SHZ |                  |                  |                  |                  |                  |                  |                              |
| Priority 1 Streams                             | 0                | 1                | 2                | 3                | 5                | 5                | 32*                          |
| Priority 2 Streams                             | 0                | 1                | 1                | 2                | 2                | 2                | 0*                           |
| Priority 3 Streams                             | 0                | 1                | 1                | 6                | 6                | 5                | 1*                           |
| Total Number of Stream<br>Crossings            | 0                | 19               | 23               | 24               | 27               | 23               | 32*                          |
| Number of Stream Crossings<br>within SHZ       |                  |                  |                  |                  |                  |                  |                              |
| Priority 1 Streams                             | 0                | 11               | 15               | 11               | 16               | 15               | 30*                          |
| Priority 2 Streams                             | 0                | 1                | 2                | 3                | 5                | 3                | 0*                           |
| Priority 3 Streams                             | 0                | 0                | 0                | 8                | 7                | 5                | 2*                           |

\* Patton River/Beach River only. Does not include Macleod Harbor area.



#### 4-4 Indices of the effects to fisheries habitat in major watersheds from proposed forest roading.

|                          | MacLeod Cr<br>#17070 | Nellie<br>Martin R.<br>#17790 | San Juan R.<br>#17000 | Beach Cr.<br>#17780 | Strike Cr.<br>#17870 | Deception<br>Creek<br>#17880 | Unnamed<br>#17837 |
|--------------------------|----------------------|-------------------------------|-----------------------|---------------------|----------------------|------------------------------|-------------------|
| Miles of Forest Road     |                      |                               |                       |                     |                      |                              |                   |
| Development in Watershed |                      |                               |                       |                     |                      |                              |                   |
| Proposed Private         | *                    | 16                            | 0                     | 21                  | 0                    | 0                            | 0                 |
| Alternative 1            | 0                    | 0                             | 0                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 2            | 4                    | 0                             | 9                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 3            | 4                    | 0                             | 16                    | 0                   | 0                    | 0                            | 0                 |
| Alternative 4            | 2                    | 5                             | 11                    | 0                   | 3                    | 1                            | 3                 |
| Alternative 5            | 2                    | 6                             | 13                    | 0                   | 3                    | 1                            | 3                 |
| Alternative 6            | 2                    | 7                             | 13                    | 0                   | 4                    | 1                            | 2                 |
| Miles of Forest Road     |                      |                               |                       |                     |                      |                              |                   |
| Development in SHZ       |                      |                               |                       |                     |                      |                              |                   |
| Proposed Private         | *                    | 14                            | 0                     | 19                  | 0                    | 0                            | 0                 |
| Alternative 1            | 0                    | 0                             | 0                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 2            | 1                    | 0                             | 1                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 3            | 1                    | 0                             | 2                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 4            | 2                    | 2                             | 1                     | 0                   | 2                    | 1                            | 1                 |
| Alternative 5            | 2                    | 3                             | 2                     | 0                   | 2                    | 1                            | 2                 |
| Alternative 6            | 2                    | 3                             | 2                     | 0                   | 1                    | 1                            | 2                 |
| Number of Road Crossings |                      |                               |                       |                     |                      |                              |                   |
| within the SHZ           |                      |                               |                       |                     |                      |                              |                   |
| Proposed Private         | *                    | 18                            | 0                     | 12                  | 0                    | 0                            | 0                 |
| Alternative 1            | 0                    | 0                             | 0                     | 0                   | 0                    | 0                            | 0                 |
| Alternative 2            | 1                    | 0                             | 11                    | 0                   | 0                    | 0                            | 0                 |
| Alternative 3            | 2                    | 0                             | 15                    | 0                   | 0                    | 0                            | 0                 |
| Alternative 4            | 3                    | 1                             | 10                    | 0                   | 4                    | 0                            | 4                 |
| Alternative 5            | 5                    | 3                             | 13                    | 0                   | 3                    | 1                            | 3                 |
| Alternative 6            | 3                    | 4                             | 11                    | 0                   | 2                    | 1                            | 2                 |

\* The proposed miles of private road development in the MacLeod Creek drainage is unknown.

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Approximately 14 miles of road would be constructed within Stream Habitat Zones. Six miles would be constructed within the San Juan River or Nellie Martin River Priority 1 SHZs (Tables 4-3, 4-4).

At least 23 to 27 stream crossing structures would be required. Eleven to thirteen of these would occur in anadromous habitat within Priority 1 SHZ (Table 4-3).

Common to Alternatives 2-6 - In the lower reaches of the streams where large quantities of spawning gravel occurs, bridges or other structures would maintain existing streambed conditions and minimize impacts to salmon spawning. Minor reductions in spawning habitat for pink salmon and coho salmon would occur where metal culverts are used for stream crossing structures on smaller streams, but the loss of habitat would be minor and would not result in an observable change in the habitat capability or population levels of any MIS under any of the action alternatives.

The proposed road development activities may cause a short term increase in suspended and bedload sediment downstream of the road corridors during construction within the affected watersheds. This effect would be short term and sediment input levels would likely return to pre-project levels shortly after construction was completed and disturbed areas were stabilized. A much smaller but more long term increase in sedimentation would occur as a result of drainage from the road surface.

Because of the absence of sediment inputs from existing roads, the relatively small amount of road construction within individual Stream Habitat Zones, and the large flow fluctuations and high flushing rates in the affected streamcourses, the increased sedimentation from the proposed road construction under any of the action alternatives would not cause any observable changes in MIS populations or in aquatic habitat capability within the affected streams.

### Effects of Fish Habitat Improvements

Several fish habitat improvement projects in Prince William Sound have increased the habitat capability for anadromous fish. The modification of barriers and the installation of fishways has provided access to previously unavailable habitat. Spawning channel and rearing pond construction has created new habitat. The removal of debris barriers and stream stabilization projects have improved pink salmon spawning habitat, but these projects have so far demonstrated a limited project life on Montague Island. In SE Alaska streams, instream structures and large woody debris additions have increased the habitat capability for coho salmon.

The primary purpose of fish habitat improvement projects in Prince William Sound is to increase or maintain the number of harvestable salmon available to the commercial and sport fishery.

Alternative 1 (No Action) - Feasibility studies would be conducted at four potential fish habitat improvement sites in MacLeod Harbor, Stump Lake, and Chalmers River, but none of the projects would be implemented. If feasible, the projects would be retained for possible development in the next planning period. The opportunity to increase the habitat capability by an estimated 120,000 pounds of pink and chum salmon per year



and to maintain the habitat capability of a 200 acre lake for coho, sockeye, cutthroat trout, and Dolly Varden Char would be forgone for the remainder of the planning period.

Alternatives 2 and 3 - Feasibility studies would be completed on 8 potential fish habitat improvement sites in the MacLeod Harbor, San Juan Bay, and Port Chalmers areas. The feasibility of stabilizing the outlet to Stump Lake to maintain the existing water level in this 200 acre lake would also be evaluated. If feasible, the projects would be implemented.

The proposed potential projects would increase the habitat capability within the project area by an estimated 168,000 pounds annually of pink and chum salmon and an estimated 37,000 pounds of coho salmon per year. The increased pink and chum salmon production would occur in the MacLeod Harbor and the Port Chalmers areas and would primarily benefit commercial fishermen. The increased coho salmon production would primarily result from a series of rearing pond excavation projects associated with the proposed road construction. The bulk of the increased coho production would occur in MacLeod Creek and San Juan River and would primarily benefit sports fishermen. Three additional stream stabilization projects and barrier modification projects along the road corridor between MacLeod Harbor and San Juan Bay would also increase the opportunities for sports fishing by increasing the habitat capability for coho salmon in these areas.

Lack of access would limit the feasibility of fish habitat improvement projects on the outer coast of Montague Island and within the Nellie Martin drainage.

Alternatives 4, 5 and 6 - Under alternatives 5 and 6, feasibility studies would be completed on 14 potential habitat improvement sites in the MacLeod Harbor, San Juan Bay, and Port Chalmers areas as well as along the outside coast of Montague Island and within the Nellie Martin River drainage. The feasibility of stabilizing the outlet of Stump Lake to maintain the existing water level in this 200 acre lake would also be evaluated. If feasible, the projects would be implemented.

The proposed potential projects would increase the habitat capability within the project area by an estimated 168,000 pounds annually of pink and chum salmon and an estimated 57,000 pounds of coho salmon per year. The increased pink and chum salmon production would occur in the MacLeod Harbor and the Port Chalmers areas and would primarily benefit commercial fishermen. The increased coho salmon production would primarily result from a series of rearing pond excavation projects associated with the proposed road construction. The bulk of the increased coho production would occur in MacLeod Creek and San Juan River and would primarily benefit sports fishermen. Eight additional stream stabilization projects and barrier modification projects along the road corridor between MacLeod Harbor and the Nellie Martin River would increase the opportunities for sports fishing by increasing the habitat capability for coho salmon.

### **Effects of Recreation Developments**

Recreational developments such as cabins and foot trails have the potential to cause streambank erosion and sedimentation if constructed or located improperly or if recrea-



## 4 Environmental Consequences

tional use is concentrated. However, the activities proposed under any of the action alternatives are unlikely to effect the habitat capability for any of the aquatic MIS.

Proposed trails, cabins and roads will increase access and opportunities to harvest anadromous and resident sport fish. Increased fishing pressure, especially under Alternative 5, may result in more restrictive harvest regulations. A more complete discussion of the combined effects of the proposed actions on fishing opportunities is discussed in the section on fishing.

### **Cumulative Effects of Activities on National Forest and Private Lands**

In addition to the timber harvest and roading activities proposed for National Forest lands under the various alternatives, the Chugach Alaska Corporation (CAC) plans to harvest large tracts of timber in the MacLeod Creek, Nellie Martin River, and Beach River watersheds. For these streams, the combined activities on National Forest and private lands may result in significant reductions in aquatic habitat capability for pink and coho salmon.

Adverse impacts to habitat capability are primarily attributed to the planned timber harvest on private lands. According to information provided by Chugach Alaska Corporation (CAC), essentially 100 percent of the commercial forest within Priority 1 Stream Habitat Zones (SHZ) on CAC lands (2650 acres) would be harvested. This would be approximately 14, 13 and 47 percent of the land adjacent to the anadromous portions of MacLeod Creek, Nellie Martin River and Beach River, respectively. Harvest on private lands would equal 17, 28, and 60 percent, respectively, of the total land area within SHZs (Table 4-2a-2b). The percent harvest within the Patton River portion of the SHZ, which is a major tributary to Nellie Martin River, would be much greater than displayed for the Nellie Martin River SHZ as a whole.

Timber harvest on CAC lands is assumed to be fully consistent with the requirements of the Alaska State Forestry Practices Act and the Alaska Statute Title 16. However, these regulations generally allow the harvest of all commercial timber in riparian habitats and adjacent to stream banks. Intensive timber harvest adjacent to anadromous fish streams on private lands will likely significantly reduce the habitat capability for coho salmon within the three affected streams. Similarly, intensive harvest within the SHZ would effect a large percentage of the braided stream channels and coho rearing habitat. Harvesting to the streambanks will reduce streambank stability through the loss of undercut banks and other instream cover. Sedimentation of all aquatic habitats and significant reductions in instream and future sources of large woody debris (LWD) is expected. The habitat capability of the three affected streams on Montague Island to produce coho salmon will decrease in direct proportion to the reduction of LWD and other instream cover.

Both the extent and location of roading needed to support the planned private timber harvest on Montague Island and the decreased streambank stability associated with harvest to the streambank will likely combine to increase sedimentation to a level resulting in reduced quality of spawning habitat and a loss of habitat capability for pink salmon (Table 4-4).

Timber harvest and roading on National Forest lands have the potential to increase the combined impacts to the fisheries resources of MacLeod Creek and Nellie Martin River. However, these increases are insignificant when compared to planned actions on private lands. Between 12 and 15 acres would be harvested on National Forest lands in the MacLeod Creek SHZ (2 percent). Less than one mile of anadromous stream-bank would be effected. Alternatives 5 and 6 propose harvest of approximately 2 percent (78 to 90 acres) of the Nellie Martin SHZ, also effecting less than one mile of area near anadromous streams (Table 4-2a-2b). Alternatives 4, 5 and 6 propose from 5 to 7 miles of road construction within the Nellie Martin River watershed. Alternatives 2-6 propose from 2 to 4 miles of road construction in the MacLeod Creek watershed (Table 4-4). No land disturbing activities would occur on National Forest lands within the Beach River watershed under any alternative.

Although timber harvest and road development on National Forest lands increases the overall intensity of disturbance activities within the Nellie Martin watershed, the increase in cumulative effects would be insignificant due to the location of the proposed activities. All harvest on private lands would occur within the Patton River drainage, a major tributary to the Nellie Martin River which enters the main river approximately 1/2 mile above its mouth. Timber harvest and road development activities on National Forest lands would only occur within the main watershed. None would occur within the Patton River drainage.

### **Long Term Effects**

The potential for long term effects to the fisheries resource on Montague Island depends on the land management practices and techniques used for the proposed timber harvest and road development as well as the timing, location, and magnitude of future activities.

The Management Standards and Guidelines for timber harvest and road development for National Forest lands on Montague Island are designed to maintain the existing levels of Large Woody Debris, provide for future sources of LWD, maintain instream cover, maintain streambank stability, provide fish passage where necessary, and minimize sedimentation from road construction; the aquatic habitat capability for these streams would be expected to remain constant over time. There would be some potential for reduced primary productivity in small streams adjacent to harvest units due to increased shading from second growth stands. However, given future riparian management actions as directed by standards and guidelines, the capability of the aquatic habitat will be maintained.

The habitat capability of streams on Montague Island to produce pink and coho salmon and cutthroat trout would be increased by approximately 200,000 to 225,000 pounds of fish per year if the identified habitat improvement opportunities prove feasible and are implemented. The majority of these projects would provide long term fisheries benefits for 25 or more years. Proposed stream stabilization projects would likely provide more short term benefits. Periodic reconstruction would be necessary to retain their effectiveness.



## 4 Environmental Consequences

The future aquatic habitat capability of streams on private lands which are subjected to intensive streambank harvest would decrease substantially. All future sources of large woody debris (LWD) would be removed. Habitat capability would decline over time as the existing LWD decayed or was carried out of the system. The long term reductions in habitat capability for coho salmon would be proportional to the loss of LWD. The reduction in LWD would also effect pink salmon production by destabilizing or removing a portion of the existing spawning habitat. Declines would continue until stream-side timber once again grew large enough and began falling into the streamcourse. Unless a specific habitat rehabilitation measures are initiated to counteract the reductions in LWD, these effects could be expected to last a minimum of 100 years. Harvest to the streambank may reduce primary production within streams due to increased shading from second growth stands. These effects could be severe in small coho rearing tributaries. Thinning the second growth stands adjacent to streamcourses could reduce these effects.

An analysis of the impacts of future timber harvest on Montague Island assumes that all suitable timber on National Forest land could be harvested by the end of the rotation. This would include approximately 10,000 acres of additional commercial forest land located in small stands throughout the north and west portions of the island and additional harvest areas within the San Juan River, Nellie Martin River, Strike Creek, Deception Creek, and Stream #17837 watersheds. Little, if any, additional timber would be available for harvest within the MacLeod Creek or Beach River watersheds.

Because other resource constraints were not considered in the suitability determination throughout Montague Island, the assumption that all current suitable CFL would be available for harvest overestimates the actual amount of potential harvest. Many of the areas currently classified as suitable are located on active alluvial fans, they contain high densities of small coho rearing tributaries, or they are adjacent to highly unstable streamcourses. These areas could not be harvested without significant adverse impacts to fish habitat capability. Harvesting such areas would violate the Management Area Wide Standards and Guidelines.

This analysis assumes that the Management Standards and Guidelines for the Big Islands are maintained through the rotation. Therefore, most of the timber remaining after the current planning period within the San Juan River and Nellie Martin stream habitat zones would not be harvested. Additional harvest would occur within the Strike Creek, Deception Creek, and Stream #17837 SHZ, as well as within several small drainages throughout the north and west portions of Montague Island, but the amount and type of harvest would be managed under the standards and guidelines.

Significant impacts to fish habitat capability are not anticipated as high hazard areas would be removed from the suitable land base. The proposed Big Islands Management Standards and Guidelines would be maintained.



## **Fishing**

### **Short Term Effects on Fishing**

The effects of the proposed activities on commercial and sport fishing would be a combination of the potential increases in habitat capability from habitat improvement projects and the increased access and opportunities to harvest sport fish provided by new roads and trails. None of the proposed timber harvest, forest roading or recreation development activities on National Forest lands would have an observable adverse effect on the numbers of fish available.

The proposed fish habitat improvement projects would provide an additional 168,000 pounds of pink and chum salmon per year and approximately 2,530 to 7,090 additional coho salmon per year on Montague Island if the projects prove to be feasible and are implemented. The majority of the pink and chum salmon would most likely be harvested by commercial fishermen between San Juan Bay and MacLeod Harbor. Some of the additional coho salmon would also be harvested by commercial fishermen, but the majority of these fish would likely be harvested by sport fishermen.

The additional coho salmon and cutthroat trout which would be produced by the proposed habitat improvement projects under alternatives 2 and 3, if they prove to be feasible, would provide for an estimated increase of 910 Wildlife and Fish User Days (WFUDs). Use rates would increase by approximately 1180 WFUDs under Alternatives 4, 5, and 6. Increases in WFUDs from other management activities is discussed in the recreation section of Chapter 4.

A substantial sport fishery for coho salmon would be created in MacLeod Harbor. The existing opportunity in the San Juan River would be significantly improved. Several lesser opportunities for sport fishing for coho salmon or cutthroat trout would also be created or improved under each of the action alternatives.

The proposed road and trail construction would increase access to fish streams and opportunities to harvest sport fish. Overall harvest would likely increase over current levels under all action alternatives in the short-term. Those alternatives with the greatest amount of road and trail building and camping facilities would allow for the greatest increase. Access and camping related facilities are greatest under Alternative 5, followed by alternatives 6, 4, 3 and 2, respectively.

### **Cumulative Effects of National Forest Activities and Private Activities on Fishing Opportunities**

National Forest and private timber harvest and road construction activities on Montague Island would have a high potential to reduce coho salmon, pink salmon, and cutthroat trout populations in the Nellie Martin River and Beach River. These results would be almost exclusively a result of actions on private lands. Reductions in the number of coho salmon available in the Nellie Martin River could somewhat reduce the attractiveness of this sportfishing area. Reductions in sport fishing success on the Nellie

## **4 Environmental Consequences**

Martin River or Beach River could also result in increased sport fishing pressure on other areas in Prince William Sound.

Anadromous fish habitat capability in the MacLeod Harbor area could decline somewhat as a result of activities on private lands. Increased production from habitat improvement projects on National Forest land, if they prove to be feasible, would tend to offset the declines. Production of coho salmon would increase substantially as a result of the proposed rearing ponds projects and would create an excellent opportunity for a new coho sport fishery. The production of pink salmon in the MacLeod Harbor area would remain at the current level or increase, providing improved opportunities for commercial fishermen.

### **Long-Term Effects on Fishing**

The existing opportunities for sport fishing and commercial fishing on all streams except the Nellie Martin River and Beach River are expected to be perpetuated for the foreseeable future. The Big Islands Management Standards and Guidelines provide for the maintenance of the fish habitat capability on National Forest lands. Fish habitat improvement projects, if they prove feasible, would improve a number of existing opportunities and create several new sport fishing opportunities. The majority of these projects would provide long term benefits with project lives of 25 years or more. Stream stabilization projects would have a much shorter project life and would likely have to be reconstructed periodically to maintain their effectiveness.

Timber harvest and road construction activities on private lands would likely result in a reduction in coho salmon, pink salmon, and cutthroat trout populations within the Nellie Martin River and Beach River. Population reductions would continue as the large woody debris in the streams decayed and the existing habitat deteriorated. A decrease in sport fishing opportunities in these streams would likely increase the sport fishing pressure in other areas around Prince William Sound.

Roads and trails throughout south Montague, and eventually throughout Montague Island would greatly increase the opportunities to harvest anadromous and resident sport fish on the island. As the amount of sport fishing pressure increases and the amount of overall harvest increases, more restrictive harvest regulations could be imposed.

## **Wildlife**

Effects of timber harvest on wildlife and their habitats are variable and depend on the requirements of individual species. Following harvest, forest development follows predictable stages of succession. Primary habitat components affected by these changes are forage availability and quality and both thermal and hiding cover. Evaluation of the effects, both positive and negative, from timber harvest must be made in relation to chan-



ges in the availability, abundance and distribution of these habitat components for each wildlife species over time.

Alaska Department of Fish and Game Big Game Management subunits (Map 2), within the larger Big Game Management Unit 6, are used to summarize analysis information for wildlife species. These subunits are the land areas by which ADF&G wildlife population data is collected and summarized. Subunits 35, 36 and 37 on south Montague Island encompass the entire area proposed for timber harvest activities.

## **Sitka Black-Tailed Deer**

### **General Effects of Timber Harvest**

The capability of winter habitat to support Sitka black-tailed deer is a function of forage abundance and quality, snow interception qualities of the overstory, and climate as influenced by aspect, elevation and maritime conditions (Hanley et al. 1987, Hanley and Rose 1987, Kirchhoff and Schoen 1987, Shishido 1986). Deer populations also respond to hunting pressure and predators, where present. In the short-term, timber harvest converts mature forest into early successional shrub and forb stages. Clearcuts 0-25 years of age provide abundant forage and improve the opportunity for more deer to enter the winter in good condition, but lack canopy cover to intercept snow, thereby making most forage unavailable during moderate or deep snow years. In the long-term, timber harvest converts mature stands into even-aged, closed canopy stands from 25 through 100 years. The closed canopies in second-growth stands intercept snow well and provide some thermal cover, but the lack of preferred browse species in the understory reduces the habitat capability for deer.

In most cases, timber harvest reduces both the short-term and long-term quality of deer winter range. It is assumed that once deer winter range is harvested, it is not replaced in the life of the standard timber rotation (100 years) and there is a corresponding loss in Sitka black-tailed deer production. The combination of a deep snow winter and large amounts of winter deer range converted to clearcuts or second-growth increases impacts to deer populations. However, even under unlogged conditions a deep-snow winter can kill many deer.

### **Effects of Precommercial Thinning**

The Forest Service, in SE Alaska, is experimenting with the manipulation of second growth stands to develop the characteristics of mature forest earlier than would naturally occur in terms of snow interception and forage production. Initial results are providing valuable tools and techniques to increase the value of second growth stands to wildlife.

Alternatives 2-6 propose to precommercially thin a total of 1568 acres of second growth with an emphasis on improving the wildlife habitat values, especially for wintering deer (Maps J, K, L, M, N, and O). In the short-term, forage quantity, quality and diversity should increase and slash clearing would ensure accessibility to deer. The increased forage would be most available to wintering deer during mild winters but unavailable during severe winters. Brown bears should benefit from the increase in berry producing shrubs.



## 4 Environmental Consequences

In the long-term, mature forest character is expected to be reached sooner than would be expected without thinning or under a timber thinning prescription. All wildlife species dependent on mature forests should benefit.

The increased habitat capability for deer and other wildlife from thinning of second growth stands is not reflected in the following analyses. While it has been shown that forage productivity for deer can be extended for about 10 years by precommercial thinning clearcuts less than 15 years of age (Kessler 1984), results in older aged stands are not as clearly defined. Similarly, the time at which second growth stands would begin to demonstrate mature forest character is not certain. While the effects are expected to be positive, actual increases in habitat capability over those reflected in the following long-term analysis are not yet quantifiable.

Monitoring of the vegetative response would provide a basis for refinement of future second growth management techniques and a more certain evaluation of the benefits to wildlife.

### **Black-Tailed Deer Model**

The Forest Service and Alaska Department of Fish and Game biologists have jointly developed a habitat capability model (Barber et al. 1988) to predict the effects of timber harvest on deer. The Sitka black-tailed deer model from SE Alaska (Suring et al. 1988a) was used as a basis but modified to fit the conditions in Prince William Sound. The model, assisted by a computerized geographic information system, provides site-specific information to predict impacts. The model uses aspect, vegetation type, timber volume class, relative snow depth and climate as predictors of habitat suitability. Mid-volume mature commercial forest stands on south aspects at low elevations in areas of relatively low snow depths provide the best winter habitat conditions (Maps C and D).

Predation is not considered to be a significant factor affecting deer populations on Montague Island. Brown bears are the only natural predators and are in hibernation during most of the critical months.

Winter habitat capability is displayed as "effective acres". Effective acres for each vegetation stand is calculated by multiplying the acres times a coefficient which evaluates the snow interception and forage production qualities of the stands with respect to its elevation and aspect for a given winter severity category. The effective acres for a 50 acre mid-volume Sitka spruce stand on a south aspect at low elevation for a deep snow winter would be calculated as follows:  $50 \times 0.3 = 15$ . The same stand during a low snow winter is estimated to provide 50 effective acres. A 50 acre Sitka spruce stand on a north aspect at a high elevation during a deep snow winter is presumed to provide 0 effective acres. The total effective acres for a given winter severity scenario are the summation of the effective acres of each stand within the defined area.

Estimates from SE Alaska indicate winter deer numbers are approximately 125 deer per 640 effective acres. Deer densities for the Big Islands Management Area are not avail-

able, however they are likely lower than estimates for SE Alaska because of harsher winter conditions.

Given the relationship between habitat capability and populations discussed previously, it can generally be inferred that a reduction in habitat capability (effective acres) displayed in the model would result in a similar trend in population numbers. Actual population sizes in small areas will fluctuate considerably from those inferred from the model.

The existing effective acres at 1989 for the various winter severity scenarios is displayed in Table 4-5. Approximately 65, 67, 77 and 70 percent of the deep, moderate, low and mean snow winter deer habitat capability on Montague Island comes from National Forest lands. State selected lands provide only one percent of the habitat capability under all snow scenarios, with the remaining provided by private lands.

#### **Frequency of Low, Moderate, and Deep Snow Winter**

The frequency of each of the three snowfall winters was estimated through examination of the weather records since 1909 at various locations throughout Prince William Sound. Information was incomplete and records from various locations were often combined. Deep, moderate and low-snow winters are assumed to occur approximately 15, 70 and 15 per cent of the time, respectively.

Yearly variation in winter severity was tracked by calculating a mean habitat capability (MHC). The MHC is "effective acres" on the average and was determined by weighting each snowfall habitat capability by its expected frequency of occurrence.

In a general sense, it is assumed that during a deep snow year most deer are forced to the low elevation beach fringe stands and movement between stands is generally precluded by snow depths. In a moderate snow year, stands with adequate snow interception capability and forage at mid-elevations also provide winter habitat, but snow depths minimize movement between stands. Forage in all forested habitats are available to deer in various degrees during low snow winters with snow depths at low to mid-elevations generally not restricting movements between stands.

#### **Short-term Effects of Timber Harvest**

Short-term impacts of proposed timber harvest on National Forest lands for the period 1989-1999 are estimated for three snowfall scenarios in Table 4-6. Habitat capability for National Forest lands on Montague Island as a whole would be reduced between two and four percent for all winter severities for all action alternatives. On south Montague (Game Management Unit 6, subunits 35, 36 and 37, see Map 2) deep and moderate snow winter habitat capability would be reduced by three percent for Alternative 2, six percent for Alternative 3, seven percent for Alternative 4 and nine percent for Alternatives 5 and 6 (Maps J, K, L, M, and N). Low snow winter capability on south Montague would be reduced between one and three percent and mean habitat capability would be reduced between three and six percent. The effect of timber harvest is most pronounced during a deep-snow winter when deer need as much mature forest canopy as possible. During low snow winters, a snow intercepting canopy is less important.

## 4 Environmental Consequences

Alternatives 2 and 3 concentrate harvest in Game Management Unit 6, subunit 35. Alternative 4 proposes harvest in subunits 35 and 36, whereas Alternatives 5 and 6 propose harvest in all three subunits on National Forest lands on south Montague. Subunit 35 deep snow winter habitat capability is reduced by 9, 19, 11, 13 and 13 percent under Alternatives 2, 3, 4, 5 and 6 respectively. Subunit 36 deep snow habitat capability is reduced by approximately 13 percent under Alternatives 4, 5 and 6. Reductions to subunit 37 deep snow winter habitat capability are only 2 and 4 percent for Alternatives 5 and 6 respectively.



#### 4-5 Effective acres of 1989 winter deer habitat on Montague Island, by landowner.

| Affected Area   | Snow Depth | National Forest |    | State Selected |   | Private |    | Total acres on all Ownerships |
|-----------------|------------|-----------------|----|----------------|---|---------|----|-------------------------------|
|                 |            | Acres           | %  | Acres          | % | Acres   | %  |                               |
| Montague Island | Deep       | 3,794           | 65 | 72             | 1 | 1,962   | 34 | 5,828                         |
|                 | Moderate   | 6,968           | 67 | 94             | 1 | 3,397   | 32 | 10,459                        |
|                 | Low        | 21,464          | 77 | 290            | 1 | 6,015   | 22 | 27,769                        |
|                 | Mean       | 8,666           | 70 | 120            | 1 | 3,575   | 29 | 12,361                        |
| South Montague* | Deep       | 1,766           | 47 | 0              | 0 | 1,962   | 53 | 3,728                         |
|                 | Moderate   | 3,332           | 50 | 0              | 0 | 3,397   | 50 | 6,729                         |
|                 | Low        | 10,294          | 63 | 0              | 0 | 6,015   | 37 | 16,309                        |
|                 | Mean       | 4,141           | 54 | 0              | 0 | 3,575   | 46 | 7,716                         |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36, and 37. See Map 2.

#### 4-6 Effectives acres of 1947 and 1989 winter deer habitat on National Forest, Montague Island, by alternative.

| Affected Area   | Snow Depth | Acres at 1947 | Acres at 1989 | % of 1989 Acres at 1999 Alternative |    |    |    |    |    |
|-----------------|------------|---------------|---------------|-------------------------------------|----|----|----|----|----|
|                 |            |               |               | 1                                   | 2  | 3  | 4  | 5  | 6  |
| Montague Island | Deep       | 4,165         | 3,794         | 100                                 | 98 | 97 | 97 | 96 | 96 |
|                 | Moderate   | 7,711         | 6,698         | 100                                 | 98 | 97 | 96 | 96 | 96 |
|                 | Low        | 22,513        | 21,464        | 100                                 | 99 | 99 | 99 | 99 | 98 |
|                 | Mean       | 9,399         | 8,666         | 100                                 | 99 | 98 | 97 | 97 | 97 |
| South Montague* | Deep       | 1,939         | 1,766         | 100                                 | 97 | 94 | 93 | 91 | 91 |
|                 | Moderate   | 3,678         | 3,332         | 100                                 | 97 | 94 | 93 | 91 | 91 |
|                 | Low        | 10,767        | 10,294        | 100                                 | 99 | 98 | 97 | 97 | 97 |
|                 | Mean       | 4,481         | 4,141         | 100                                 | 97 | 95 | 94 | 93 | 94 |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36, and 37. See Map 2.

## 4 Environmental Consequences

Current deer populations on Montague Island are considered to be high, as no deep snow winters have reduced populations since the early 1970's. All alternatives would maintain enough habitat to support current deer populations under a low snow winter. A deep snow winter, even under Alternative 1, would probably significantly reduce deer populations on Montague Island. Deer numbers would be further reduced in subunits 35 and 36 proportional to the reduction in deep snow winter habitat capability for each action alternative. Alternatives 5 and 6 would probably not significantly reduce numbers in subunit 37 above that expected from a deep snow winter under Alternative 1. However, overall impacts to deer winter habitat capability on south Montague are greatest under Alternatives 5 and 6. Alternative 2 has the least effect of all action alternatives and limits effects to Game Management subunit 35.

The level of impact from any action alternative is probably insignificant, by itself, to the overall habitat capability on Montague Island.

### **Cumulative Effects of Forest Service and Private Timber Harvest**

The combined effects of timber harvest activities on deer winter habitat capability on Montague Island is displayed in Table 4-7. Habitat capability on Montague Island for mean snow winters would be reduced by 18 to 20 percent under Alternatives 1-6. Habitat capability on south Montague Island would be reduced from 43 to 39 percent for a deep snow winter, 33 to 38 percent for a moderate snow winter, 18 to 16 percent for a low snow winter and 32 to 28 percent for a mean snow winter. Reduction of habitat capability for Alternative 1 is a result of actions on private land only.

Impacts from private harvest are limited to subunits 35 and 37. Cumulative effects of Forest Service and private actions would reduce the deep winter habitat capability from 20 to 28 percent in subunit 35 and from 54 to 55 percent in subunit 37.

The level of harvest proposed on National Forest and private lands, under all alternatives, would likely significantly reduce the deer winter habitat capability on south Montague under all snow scenarios, with the possible exception of a low snow winter. Potential effects are most significant in subunit 37, and are mostly a result of private actions. Private lands in subunit 37 contribute approximately 34, 32, 22 and 29 percent of existing deep, moderate, low and mean habitat capability, respectively, on Montague Island.

The effects of this expected reduction in habitat capability on deer hunting is discussed in the section on hunting and trapping.

### **Long-Term Effects**

In the long-term, timber harvest converts mature forest stands into even-aged, closed canopy stands. The closed canopy intercepts snow well and provides thermal cover, but preferred browse species are eliminated and therefore, habitat capability is reduced.

This analysis attempts to predict the long-term cumulative effects of timber harvest on deer habitat capability and populations from previous, and proposed current and future harvest to the end of the rotation on all lands, regardless of ownership, on Montague Island.

The analysis assumes:

1. All timber on National Forest Lands currently classified as suitable, and not under a wildlife retention prescription, would be harvested by the end of the rotation.
2. All timber harvested between 1947-1973 and stands currently classified as second growth as a result of blowdown or the 1964 earthquake were high volume stands prior to 1947.
3. No timber would be harvested on State selected lands during the life of the rotation.
4. All commercially available timber on private lands would be harvested by 1999 and in second growth throughout the remainder of the rotation.

From 1947 to 1989 habitat capability on Montague Island declined by 9, 10, 5 and 8 percent for deep, moderate, low and mean snow scenarios, respectively. Habitat capability reductions were similar when viewed for south Montague only (Table 4-8). Reductions were a result of Forest Service timber harvest activities between 1947 and 1973, blowdown and the 1964 earthquake all of which converted mature forest to second growth stands.

Past harvest activities were concentrated in Game Management 6, subunits 34 and 35. Subunit 35 habitat capability was reduced by 22, 22, 10 and 18 percent for deep, moderate, low and mean snow winters, respectively. Habitat capability in subunits 36 and 37 was not affected.

Past harvest combined with effects of proposed harvest to the end of the rotation would reduce the deep, moderate, low and mean habitat capability on Montague Island by 40, 47, 40 and 44 percent. Second growth management techniques may provide limited opportunities to reduce the long-term effects.



## 4 Environmental Consequences

4-7 Effective acres of 1947 and 1989 winter deer habitat after proposed harvest on National Forest and private land on Montague Island, by alternative.

| Affected Area   | Snow Depth | Acres at 1947 ** | Acres at 1989 ** | % of 1989 Acres at 1999 **<br>Alternative |    |    |    |    |    |
|-----------------|------------|------------------|------------------|---|----|----|----|----|----|
|                 |            |                  |                  | 1   | 2  | 3  | 4  | 5  | 6  |
| Montague Island | Deep       | 6,280            | 5,828            | 75  | 74 | 73 | 73 | 72 | 72 |
|                 | Moderate   | 11,363           | 10,459           | 79  | 77 | 77 | 76 | 76 | 76 |
|                 | Low        | 29,307           | 27,769           | 90  | 90 | 90 | 89 | 89 | 89 |
|                 | Mean       | 13,251           | 12,361           | 82  | 81 | 81 | 80 | 80 | 80 |
| South Montague* | Deep       | 3,982            | 3,728            | 61  | 60 | 58 | 58 | 57 | 57 |
|                 | Moderate   | 7,236            | 6,729            | 67  | 65 | 64 | 63 | 63 | 62 |
|                 | Low        | 17,001           | 16,309           | 84  | 83 | 82 | 82 | 82 | 82 |
|                 | Mean       | 8,213            | 7,716            | 72  | 70 | 69 | 69 | 68 | 68 |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36, and 37. See Map 2.

\*\*Includes effective acres on National Forest, State selected and private lands.

4-8 Effective acres of winter deer habitat on Montague Island in 1947, and the end of the rotation.

| Affected Area   | Snow Depth | Acres at 1947 ** | Acres and (%) of 1947 acres at 1989 ** | Acres and (%) of 1947 Acres at ** End of Rotation |
|-----------------|------------|------------------|--|---|
| Montague Island | Deep       | 6,280            | 5,828 (93)                             | 3,759 (60)  |
|                 | Moderate   | 11,363           | 10,459 (92)                            | 6,054 (53)  |
|                 | Low        | 29,037           | 27,769 (96)                            | 17,292 (60)                                       |
|                 | Mean       | 13,251           | 12,361 (93)                            | 7,395 (56)  |
| South Montague* | Deep       | 3,982            | 3,728 (94)                             | 2,159 (54)  |
|                 | Moderate   | 7,236            | 6,729 (93)                             | 3,408 (47)  |
|                 | Low        | 17,001           | 16,309 (96)                            | 10,818 (64)                                       |
|                 | Mean       | 8,213            | 7,717 (93)                             | 4,332 (53)  |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36, and 37. See Map 2.

\*\*Includes effective acres on National Forest, State selected and private lands.

## Effects of Roads and Humans

Roads and trails proposed under each action alternative would increase access to deer habitats and increase opportunities to harvest deer (Maps J, K, L, M and N). Hunting and other human use is expected to increase under all action alternatives, especially Alternative 5. Controlled hunting is generally not detrimental to populations. Illegal kill is presumed to be low. Harvest of deer would help to contain the population in balance with the available habitat. The major past impact to winter range habitat in Prince William Sound has been a result of over utilization of winter range by the deer themselves (ADF&G 1976).

Extensive vehicle use of roads during critical winter and spring periods in areas where deer are concentrated may result in deaths from road kills and stress related factors. The most likely source of impact would be from winter hauling of timber. However, Management Area Wide Standards and Guidelines provide for closure of these roads in winter should impacts appear to be significant.

## Brown Bear

### General Effects of Timber Harvest

Although brown bear make use of most all available habitats on Montague Island, only forested habitats are proposed for modification. For purposes of analysis of the effects of timber harvest, brown bear habitat is stratified into two categories: 1) riparian/beach fringe forests: and 2) upland forests (Maps C and D). Riparian forests are defined as commercial forest lands (CFL) or unproductive forests within 100' of streams or lakes and adjacent land types that potentially contain unmapped anadromous fish habitat (Stream Habitat Zones, Appendix E). Beach fringe forests are defined as both the CFL and unproductive forests within 500' of the coastline (prior to the 1964 earthquake). Upland forest includes both CFL and unproductive forest types not included in the beach fringe or riparian classifications. Of the two habitat types, the amount and quality of the riparian/beach fringe habitat is probably the better indicator of overall habitat quality.

Clearcutting within upland forests can potentially create highly productive foraging sites for bears for about 25 years following timber harvest depending on the species mix of the understory. Habitat capability is probably maintained or enhanced during this period, however information is unavailable on brown bear use of clearcut habitats in Prince William Sound. After 25 years, forage production and habitat capability declines as the conifer canopy closes. Clearcutting in riparian and beach fringe forests removes security cover adjacent to important salmon streams and beach foraging areas, thereby reducing habitat capability. Second growth forests provide some cover but lack the diversity and abundance of forage associated with mature stands.

There are 18,766 acres of riparian/beach fringe habitat and 83,551 acres of upland habitat on Montague Island. Twelve percent of the riparian/beach fringe and one percent of the upland forests are currently in second growth (Tables 4-9, 4-10).



### **Short-Term Effects of Timber Harvest**

The action alternatives would convert between two percent (110 acres) and seven percent (415 acres) of the mature CFL riparian/beach fringe habitats and between four percent (667 acres) and five percent (819 acres) of the mature CFL upland habitats on National Forest lands on Montague Island into second growth. Between four and sixteen percent of riparian/beach fringe and eight to ten percent of upland CFL would be converted to second growth on National Forest lands in Game Management subunits 35, 36 and 37 (south Montague, Table 4-11).

While some timber would be harvested in the riparian/beach fringe habitat, riparian/beach fringe habitat would be retained by application of the Standards and Guidelines for streamside harvest and eagle habitat protection (Appendix F). These acres would also maintain security cover for bears fishing along streams and foraging in beach fringe areas. Timber harvest in upland forests may increase forage production especially in the higher volume stands. Thus, the short-term effects of timber harvest under all alternatives would likely maintain or improve bear habitat capability.

### **Cumulative Effects of Forest Service and Private Timber Harvest**

Brown bear use all available habitats on Montague Island regardless of ownership. The effects of timber harvest on the bear populations on Montague Island are not limited to Forest Service activities. The combined percent of Forest Service harvest by alternative and private harvest is displayed in Table 4-12. Large clearcuts with poor juxtaposition of security cover and forage and expected removal of much of the security cover along important salmon streams on private lands will likely reduce the short-term habitat capability for brown bears on south Montague.

### **Long-Term Effects of Timber Harvest**

By the end of the rotation, 82 percent of the riparian/beach fringe CFL and 54 percent of the upland CFL habitats on Montague Island would be in second growth assuming that all timber on National Forest lands currently classified as suitable is harvested (Table 4-13). The effects of this level of harvest on bear habitat capability depends largely upon timing, spacing, placement, and size of timber harvest units. Bear habitat capability on National Forest lands would likely be maintained to the end of the rotation, if the future harvest is planned to: 1) provide a continual supply of recent clearcuts throughout time, 2) minimize the amount of bear habitat in unproductive older second growth stands at any time, and 3) intersperse the second growth stands with stands of mature forest to provide security cover adjacent to important riparian and beach fringe foraging areas. Management Area Wide Standards and Guidelines for timber harvest in riparian areas and measures for protection and maintenance of eagle habitat would greatly reduce the actual harvest in the riparian/beach fringe habitats. Unproductive upland and riparian/beach fringe forest lands would provide significant additional habitat capability (Tables 4-9, 4-10) throughout the rotation.

Concentrated harvest under Alternative 3 would reduce the opportunity to maintain a good mix of second growth stands, recent clearcuts and mature forest over time in Game Management 6, subunit 35. Similarly, private harvest of large areas is expected to significantly contribute to the reduction of the long-term habitat capability for brown



bears in subunit 37. The major known brown bear concentration areas on south Montague are in subunit 37 (Map C and D).

#### **Effects of Roads and Humans**

The construction of roads and trails and increased human activity would increase opportunities and demand to harvest brown bears. Increased human activity and access would increase bear mortality due to legal harvest, illegal harvest, bears killed in defense of life and property situations, and removal of nuisance bears. The increase harvest may depress bear populations.

Road and trail construction associated with each alternative would increase hunting and recreation access to brown bear habitats (Maps J, K, L, M and N). Hunter harvest would increase under each alternative. Bears killed in defense of life and property would likely increase under each alternative. Roads located on the uplifted beach with each alternative and associated disturbance may reduce the opportunities for use of these areas by foraging bears. Campgrounds, logging camps and garbage facilities associated with each alternative have the potential to increase bear-human conflicts with a subsequent increase in bear mortality. The increases in human disturbance, access and bear mortalities would be greatest under those alternatives with the most extensive road and trail building and camping facilities. Alternative 5 proposes the largest amount of roads and trails and other facilities followed by alternatives 6 and 4, and then alternatives 3 and 2.

## 4-9 Acres of Management Indicator Species habitat on Montague Island.

| MIS | Total habitat **  |        |        | Unproductive Forest |        |       | Second Growth |       |       | Mature CFL |        |       |
|-----|-------------------|--------|--------|---------------------|--------|-------|---------------|-------|-------|------------|--------|-------|
|     | Habitat           | FS     | Other  | Total               | FS     | Other | Total         | FS    | Other | Total      | FS     | Other |
|     | Brown Bear        |        |        |                     |        |       |               |       |       |            |        |       |
|     | Rip/Beach Fringe  | 13,660 | 5,106  | 18,766              |        | 1,648 | 7,008         | 2,019 | 262   | 2,281      | 6,281  | 3,196 |
|     | Brown Bear Upland | 75,431 | 8,120  | 83,551              | 59,587 | 5,013 | 64,600        | 690   | 48    | 738        | 15,174 | 3,059 |
|     | Bald Eagle        | 5,406  | 983    | 6,389               | 2,519  | 632   | 3,151         | 240   | 103   | 343        | 2,647  | 248   |
|     | PWS Canada        |        |        |                     |        |       |               |       |       |            |        |       |
|     | Goose             | 38,190 | 3,029  | 41,219              | 30,492 | 2,121 | 32,613        | 546   | 8     | 554        | 7,152  | 900   |
|     | Woodpeckers       | 89,091 | 13,226 | 102,317             | 64,947 | 6,661 | 71,608        | 2,709 | 310   | 3,019      | 21,455 | 6,255 |
|     | Common            |        |        |                     |        |       |               |       |       |            |        |       |
|     | Merganser         | 8,254  | 4,123  | 12,377              | 2,841  | 1,016 | 3,857         | 1,779 | 159   | 1,938      | 3,634  | 2,948 |

\*\* Includes mature commercial forest, second growth and unproductive forest on National Forest lands (FS), State Selected and private lands (Other) and total for all ownerships (Total).

## 4-10 Acres of Management Indicator Species habitat on south Montague Island.

| MIS | Total habitat **  |        |        | Unproductive Forest |        |       | Second Growth |       |       | Mature CFL |        |       |
|-----|-------------------|--------|--------|---------------------|--------|-------|---------------|-------|-------|------------|--------|-------|
|     | Habitat           | FS     | Other  | Total               | FS     | Other | Total         | FS    | Other | Total      | FS     | Other |
|     | Brown Bear        |        |        |                     |        |       |               |       |       |            |        |       |
|     | Rip/Beach Fringe  | 5,419  | 4,618  | 10,037              | 2,031  | 1,222 | 3,253         | 781   | 262   | 1,043      | 2,607  | 3,134 |
|     | Brown Bear Upland | 37,645 | 7,524  | 45,169              | 29,153 | 4,467 | 33,620        | 272   | 48    | 320        | 8,220  | 3,009 |
|     | Bald Eagle        | 1,531  | 600    | 2,131               | 820    | 285   | 1,105         | 96    | 103   | 199        | 615    | 212   |
|     | PWS Canada        |        |        |                     |        |       |               |       |       |            |        |       |
|     | Goose             | 14,391 | 2,158  | 16,549              | 11,496 | 1,295 | 12,791        | 122   | 8     | 130        | 2,773  | 855   |
|     | Woodpeckers       | 43,064 | 12,142 | 55,206              | 31,184 | 5,689 | 36,873        | 1,053 | 310   | 1,363      | 10,827 | 6,143 |
|     | Common            |        |        |                     |        |       |               |       |       |            |        |       |
|     | Merganser         | 3,888  | 4,018  | 7,906               | 1,211  | 937   | 2,148         | 685   | 159   | 844        | 1,992  | 2,922 |

\* Includes ADP&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Includes mature commercial forest, second growth and unproductive forest on National Forest lands (FS), State Selected and private lands (Other) and total for all ownerships (Total).

#### 4-11 Acres of mature CFL brown bear habitat proposed for harvest on Montague Island.

| Habitat             | Affected Area | Mature CFL ** at 1989 | 1   |   |     |   | 2   |    |     |   | 3   |    |     |    | 4   |   |     |   | 5   |   |     |   | 6   |   |     |   |
|---------------------|---------------|-----------------------|-----|---|-----|---|-----|----|-----|---|-----|----|-----|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
|                     |               |                       | Ac. | % | Ac. | % | Ac. | %  | Ac. | % | Ac. | %  | Ac. | %  | Ac. | % | Ac. | % | Ac. | % | Ac. | % | Ac. | % | Ac. | % |
| Montague Island     | Riparian/     |                       |     |   |     |   |     |    |     |   |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |
|                     | Beach Fringe  | 6,281                 | 0   | 0 | 110 | 2 | 217 | 3  | 242 | 4 | 415 | 7  | 400 | 6  |     |   |     |   |     |   |     |   |     |   |     |   |
|                     | Upland        | 15,174                | 0   | 0 | 667 | 4 | 797 | 5  | 757 | 5 | 736 | 5  | 819 | 5  |     |   |     |   |     |   |     |   |     |   |     |   |
| South *<br>Montague | Riparian/     |                       |     |   |     |   |     |    |     |   |     |    |     |    |     |   |     |   |     |   |     |   |     |   |     |   |
|                     | Beach Fringe  | 2,607                 | 0   | 0 | 110 | 4 | 217 | 8  | 242 | 9 | 415 | 16 | 400 | 15 |     |   |     |   |     |   |     |   |     |   |     |   |
|                     | Upland        | 8,220                 | 0   | 0 | 667 | 8 | 797 | 10 | 757 | 9 | 736 | 9  | 819 | 10 |     |   |     |   |     |   |     |   |     |   |     |   |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest lands only.

#### 4-12 Acres of mature CFL brown bear habitat proposed for harvest on National Forest or private land, by alternative.

| Habitat             | Affected Area | Mature CFL ** at 1989 | 1     |    |       |    | 2     |    |       |    | 3     |    |       |    | 4   |   |     |   | 5   |   |     |   | 6   |   |     |   |
|---------------------|---------------|-----------------------|-------|----|-------|----|-------|----|-------|----|-------|----|-------|----|-----|---|-----|---|-----|---|-----|---|-----|---|-----|---|
|                     |               |                       | Ac.   | %  | Ac.   | %  | Ac.   | %  | Ac.   | %  | Ac.   | %  | Ac.   | %  | Ac. | % | Ac. | % | Ac. | % | Ac. | % | Ac. | % | Ac. | % |
| Montague Island     | Riparian/     |                       |       |    |       |    |       |    |       |    |       |    |       |    |     |   |     |   |     |   |     |   |     |   |     |   |
|                     | Beach Fringe  | 9,477                 | 3,006 | 32 | 3,116 | 33 | 3,223 | 34 | 3,248 | 34 | 3,421 | 36 | 3,406 | 36 |     |   |     |   |     |   |     |   |     |   |     |   |
|                     | Upland        | 18,233                | 2,450 | 13 | 3,117 | 17 | 3,246 | 18 | 3,207 | 18 | 3,186 | 17 | 3,269 | 18 |     |   |     |   |     |   |     |   |     |   |     |   |
| South *<br>Montague | Riparian/     |                       |       |    |       |    |       |    |       |    |       |    |       |    |     |   |     |   |     |   |     |   |     |   |     |   |
|                     | Beach Fringe  | 5,741                 | 3,006 | 52 | 3,116 | 54 | 3,223 | 56 | 3,254 | 57 | 3,421 | 60 | 3,406 | 60 |     |   |     |   |     |   |     |   |     |   |     |   |
|                     | Upland        | 11,229                | 2,450 | 22 | 3,117 | 28 | 3,246 | 29 | 3,207 | 29 | 3,186 | 28 | 3,269 | 29 |     |   |     |   |     |   |     |   |     |   |     |   |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest, State selected and private lands.



## 4 Environmental Consequences

4-13 Acres of 1947 mature CFL brown bear habitat remaining at the end of the rotation on Montague Island.

| Affected Area    | Habitat                   | Mature CFL **<br>at 1947 | End of Rotation<br>All Alternatives<br>Acres ** % |    |
|------------------|---------------------------|--------------------------|---|----|
| Montague Island  | Riparian/<br>Beach Fringe | 11,758                   | 2119  | 18 |
|                  | Upland                    | 18,971                   | 8579  | 46 |
| South Montague * | Riparian/<br>Beach Fringe | 6,784                    | 1341  | 20 |
|                  | Upland                    | 11,549                   | 4847  | 42 |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest, State selected and private lands.

## **Bald Eagle**

### **General Effects of Timber Harvest**

The majority of bald eagles in the Big Islands Management Area nest in coniferous forests within 500' of the coastline. Bald eagle habitat for this analysis is defined as forested habitat within 500' of the coastline (prior to the 1964 earthquake). Commercial forest land (CFL) generally provides nesting sites suitable for bald eagles, however, unproductive forest stands provide some opportunities (Suring et al. 1988b).

Bald eagles prefer large diameter mature trees for nest and perch sites. Typical nest trees are at least 400 to 500 years old. Removal of perch or nest trees reduces habitat capability. Hodges (1982) estimated that every 13 years 50 percent of eagle nests are lost to wind related events. Therefore, long-term management of eagle habitat requires that alternate nest and perch sites be retained (Suring et al. 1988b).

There are 6,389 acres of eagle habitat on Montague Island, of which five percent is currently in second growth (Tables 4-9, 4-10). There are 67 known eagle nests on Montague Island (Maps C and D).

### **Short-Term Effects of Timber Harvest**

The action alternatives harvest between one percent (10 acres) to two percent (56 acres) of the mature CFL eagle habitat on National Forest lands on Montague Island (Table 4-14). Alternatives 2 and 3 propose harvest in the vicinity of a single eagle nest. This harvest unit would have the boundaries adjusted to conform to standards and guidelines for maintaining the 330' windfirm zone around eagle nest trees. No harvest is proposed near eagle nests in the other alternatives (Table 4-15). With established protection for existing nest trees and standards and guidelines for maintaining alternate nest and perch trees (Appendix F), harvest proposed for any alternative would be unlikely to have any impact on existing eagle populations.

Under various roading options proposed by alternatives there are between 3 and 7 nests within 1/2 mile of proposed roads (Table 4-15). These nests would be vulnerable to human disturbance from road construction activities and traffic.

### **Cumulative Effects of Forest Service and Private Timber Harvest**

Combined percent harvest of mature CFL eagle habitat on Montague Island from both Forest Service and private corporation actions is between six and nine percent (Table 4-16). There are 13 known eagle nests on private lands on Montague Island (Maps C and D). Six of these nests are adjacent to probable harvest areas and nine nests are within 1/2 mile of proposed roads (Table 4-17). The level of presumed private harvest, especially if windfirm buffers are not established around existing eagle nests, could significantly reduce the habitat capability for eagles on private lands. The overall reduction to eagle nesting habitat capability to south Montague on National Forest and private lands would be between 23 and 30 percent (Table 4-16).

## 4-14 Acres of mature bald eagle habitat proposed for harvest, by alternative, on Montague Island.

| Affected Area   | Mature CFL ** at 1989 | Mature CFL Harvest 1989-1999 ** |   |     |   |     |   |     |   |     |   |
|-----------------|-----------------------|---------------------------------|---|-----|---|-----|---|-----|---|-----|---|
|                 |                       | 1                               |   | 2   |   | 3   |   | 4   |   | 5   |   |
|                 |                       | Ac.                             | % | Ac. | % | Ac. | % | Ac. | % | Ac. | % |
| Montague Island | 2,647                 | 0                               | 0 | 64  | 2 | 53  | 2 | 16  | 1 | 19  | 1 |
| South *         |                       |                                 |   |     |   |     |   |     |   |     |   |
| Montague        | 615                   | 0                               | 0 | 64  | 9 | 53  | 7 | 16  | 2 | 19  | 2 |
|                 |                       |                                 |   |     |   |     |   |     |   | 29  | 4 |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest lands only.

## 4-15 Eagle nests potentially affected by proposed Forest Service actions on Montague Island.

|   | Alternatives |    |    |    |    |    |
|---|--------------|----|----|----|----|----|
|   | 1            | 2  | 3  | 4  | 5  | 6  |
| Number of eagle nests*                                |              |    |    |    |    |    |
| Montague Island                                       | 67           | 67 | 67 | 67 | 67 | 67 |
| South Montague**                                      | 36           | 36 | 36 | 36 | 36 | 36 |
| Number of eagle nests within 0.5 miles of roads       | 0            | 3  | 3  | 7  | 7  | 7  |
| Number of eagle nests within 330 feet of harvest unit | 0            | 1  | 1  | 0  | 0  | 0  |

\* Includes 13 nests on private and 2 on State selected lands.

\*\* ADF&G Game Management Unit 6, subunits 35, 36 and 37 (Map 2).



**4-16 Acres of mature CFL bald eagle habitat proposed for harvest on National Forest and private land on Montague Island, by alternative.**

| Affected Area   | Mature CFL ** at 1989 | Mature CFL Harvest 1989-1999 ** |   |     |   |     |   |     |   |     |   |
|-----------------|-----------------------|---------------------------------|---|-----|---|-----|---|-----|---|-----|---|
|                 |                       | 1                               |   | 2   |   | 3   |   | 4   |   | 5   |   |
|                 |                       | Ac.                             | % | Ac. | % | Ac. | % | Ac. | % | Ac. | % |
| Montague Island | 2,895                 | 187                             | 6 | 251 | 9 | 240 | 8 | 203 | 7 | 206 | 7 |
|                 |                       |                                 |   |     |   |     |   |     |   | 216 | 7 |

|         |     |     |    |     |    |     |    |     |    |     |    |     |    |
|---------|-----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|
| South * | 827 | 187 | 23 | 251 | 30 | 240 | 29 | 203 | 25 | 206 | 25 | 216 | 26 |
|---------|-----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest, State selected and private lands.

**4-17 Eagle nests potentially affected by proposed Forest Service and private actions on Montague Island.**

|   | Alternatives |    |    |    |    |    |
|---|--------------|----|----|----|----|----|
|   | 1            | 2  | 3  | 4  | 5  | 6  |
| Number of eagle nests*                                |              |    |    |    |    |    |
| Montague Island                                       | 67           | 67 | 67 | 67 | 67 | 67 |
| South Montague**                                      | 36           | 36 | 36 | 36 | 36 | 36 |
| Number of eagle nests within 0.5 miles of roads       | 9            | 12 | 12 | 16 | 16 | 16 |
| Number of eagle nests within 330 feet of harvest unit | 6            | 7  | 7  | 6  | 6  | 6  |

\* Includes 13 nests on private and 2 on State selected lands.

\*\* ADF&G Game Management Unit 6, subunits 35, 36 and 37 (Map 2).

## **4 Environmental Consequences**

### **Long-Term Effects of Timber Harvest**

By the end of the rotation, 75 percent of the CFL in bald eagle habitats on Montague Island (Table 4-18) would be in second growth assuming harvest of all suitable Forest Service timber. Timber harvest would reduce the number of suitable nest and perch trees and it is estimated that 50 percent of the nests would be lost to natural processes every 13 years. The effects of this level of harvest on eagle habitat capability depends partially on the continued maintenance of the 330' buffer around existing eagle nest trees, even if nests become inactive or blow down, and the availability of alternate nest and perch sites. It is unlikely that similar habitat protection measures would be considered on private lands.

Approximately 3000 acres of unproductive forest in eagle habitats on Montague Island (Table 4-9) would provide additional nesting opportunities. Many of the known eagle nest sites are located within stands classified as unproductive forest.

### **Effects of Roads and Humans**

Nesting bald eagles are vulnerable to disturbance. Whether a given event is significant or not, depends on the severity of the disturbance, stage of breeding cycle and the response of the bald eagle involved. Because bald eagles vary considerably in their response to human activity, it is difficult to predict the effects of a given type of human disturbance on individual eagles (Stalmaster, et al. 1985).

The potential disturbances to bald eagles are associated with road construction, timber harvest, and recreational use including: vehicle traffic, boat traffic, low flying aircraft, firearm discharge, blasting, foot traffic and logging. Alternative 5 has the greatest potential for disturbance to nesting eagles from increased human activity, followed by alternatives 6 and 4, then alternatives 3 and 2 (Maps J, K, L, M and N). Alternative 6 proposes the greatest amount of road adjacent to potential eagle habitat.

4-18 Acres of 1947 mature CFL bald eagle habitat remaining at the end of the rotation on Montague Island.

| Affected Area    | Mature CFL **<br>at 1947 | End of Rotation<br>All Alternatives<br>Acres ** % |
|------------------|--------------------------|---|
| Montague Island  | 3,238                    | 797 25  |
| South Montague * | 1,026                    | 367 36  |

\* Includes ADF&G Game Managment Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest, State selected and private lands.



## Prince William Sound Canada Goose

### General Effects of Timber Harvest

Upland muskeg pond habitats and associated mature forest provide nesting and brood rearing habitat for the Prince William Sound Canada Goose. Although genetic characteristics are still in question, general habitat use is similar to the Vancouver Canada Goose. Prince William Sound Goose habitat for this analysis is defined as both commercial forest and unproductive forest within 2600' of upland muskeg ponds (Doyle et al. 1988).

Clearcutting in goose nesting habitat removes the overstory important in terms of nest location, roosting and loafing sites for about 25 years, while maintaining an appropriate understory in terms of food and cover (Lebeda and Ratti 1983). Second growth stands probably provide adequate tree cover, but understories lack adequate food and low vegetative cover (Alaback 1984).

### Short-Term Effects of Timber Harvest

Prince William Sound Canada goose habitat on Montague Island totals 41,219 acres. One percent has been converted to second growth (Tables 4-9, 4-10). From two to four percent (130 to 280 acres) of the mature CFL within goose habitats on National Forest lands on Montague Island would be harvested under Alternatives 2-6 (Table 4-19). Effects from any alternative are insignificant.

### Cumulative Effects of Forest Service and Private Timber Harvest

The total impact to goose habitats on Montague Island from both Forest Service and private timber harvest activities is displayed in Table 4-20. The percent of mature CFL harvest displayed greatly exaggerates the overall impacts to goose nesting habitat from the combined effects of private actions. Few lakes are present on private lands, but most are surrounded by large areas of commercial forest. It is unlikely that removal of the mature forest adjacent to these few lakes would significantly affect overall goose habitat capability on Montague Island. Most lakes on National Forest lands are bordered by unproductive forests. Overall, harvest levels proposed in goose habitats are relatively low. Implementation of any alternative, coupled with proposed private harvest, should result in no measurable impact in the carrying capacity for Prince William Sound Canada geese.

### Long-Term Effects of Timber Harvest

By the end of the rotation, 63 percent of the goose habitat on Montague Island (Table 4-21) would be in second growth if all the suitable timber on National Forest lands is harvested. Most upland muskeg ponds are associated with unproductive forests and probably provide most of the nesting opportunities. Impacts to goose populations from proposed future harvest activities are probably much less than inferred from the loss of mature commercial forest stands.

### Effects of Roads and Humans

Roads and trails through Prince William Sound Canada goose habitat would increase opportunities for human disturbance during nesting and migration. Roads along beach habitats during fall migration creates opportunities for hunters to harvest geese. Alter-

**4-19 Acres of mature CFL Prince William Sound Canada goose habitat proposed for harvest on Montague Island, by alternative.**

| Affected Area   | Mature CFL ** at 1989 | Mature CFL Harvest 1989-1999 ** |   |     |   |     |   |     |   |     |    |
|-----------------|-----------------------|---------------------------------|---|-----|---|-----|---|-----|---|-----|----|
|                 |                       | 1                               |   | 2   |   | 3   |   | 4   |   | 5   |    |
|                 |                       | Ac.                             | % | Ac. | % | Ac. | % | Ac. | % | Ac. | %  |
| Montague Island | 7,152                 | 0                               | 0 | 141 | 2 | 130 | 2 | 243 | 3 | 280 | 4  |
| South *         |                       |                                 |   |     |   |     |   |     |   |     |    |
| Montague        | 2,773                 | 0                               | 0 | 141 | 5 | 130 | 5 | 243 | 9 | 280 | 10 |
|                 |                       |                                 |   |     |   |     |   |     |   | 246 | 9  |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest lands only.

**4-20 Acres of mature CFL Prince William Sound Canada goose habitat proposed for harvest on Forest Service and private land on Montague Island, by alternative.**

| Affected Area   | Mature CFL ** at 1989 | Mature CFL Harvest 1989-1999 ** |    |     |    |     |    |       |    |       |    |
|-----------------|-----------------------|---------------------------------|----|-----|----|-----|----|-------|----|-------|----|
|                 |                       | 1                               |    | 2   |    | 3   |    | 4     |    | 5     |    |
|                 |                       | Ac.                             | %  | Ac. | %  | Ac. | %  | Ac.   | %  | Ac.   | %  |
| Montague Island | 8,052                 | 855                             | 11 | 986 | 12 | 985 | 12 | 1,098 | 14 | 1,135 | 14 |
|                 |                       |                                 |    |     |    |     |    |       |    | 1,101 | 14 |
| South *         |                       |                                 |    |     |    |     |    |       |    |       |    |
| Montague        | 3,628                 | 855                             | 24 | 996 | 27 | 985 | 27 | 1,098 | 30 | 1,135 | 31 |
|                 |                       |                                 |    |     |    |     |    |       |    | 1,101 | 30 |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest, State selected and private lands.

## 4 Environmental Consequences

### 4-21 Acres of 1947 mature CFL Prince William Sound Canada goose habitat remaining at the end of the rotation on Montague Island

| Affected Area    | Mature CFL ** at 1947 | End of Rotation All Alternatives |    |
|------------------|-----------------------|----------------------------------|----|
|                  |                       | Acres                            | %  |
| Montague Island  | 8,606                 | 3,143                            | 36 |
| South Montague * | 3 ,758                | 1,849                            | 49 |

\* Includes ADF&G Game Managment Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest, State selected and private lands.



native 5 builds the largest amount of roads and trails followed by Alternatives 6 and 4 and alternatives 3 and 2. table 4-19 table 4-20,4-21

## **Woodpeckers**

### **General Effects of Timber Harvest**

Woodpeckers generally require large diameter trees in various stages of decay, which are generally associated with mature commercial forest stands. Unproductive forests generally have small diameter trees, although some species prefer the more open habitats associated with unproductive forests and suitable trees are often present (Suring et al. 1988c, Suring et al. 1988d). Woodpecker habitat for this analysis includes all the commercial and unproductive forest stands.

Current timber harvest activities eliminates future woodpecker nesting and roosting sites and reduces future use by secondary cavity nesters. Snags retained in clearcut areas provide some nesting habitat but clearcuts generally provide few foraging opportunities in the winter because of snow or provide unsuitable microhabitats because of cold weather. Snags that develop in second growth stands are not used by cavity nesters because they are generally too small for excavation (Chadwick et al. 1986). Remnant snags in second growth stands receive very little use by woodpeckers because of the high stem density of trees which is unsuitable for woodpeckers (Mannan et al. 1980).

There are 102,317 acres of woodpecker habitat on Montague Island. Three percent has been converted to second growth (Tables 4-9, 4-10).

### **Short-Term Effects of Timber Harvest**

From four to six percent (777 to 1219 acres) of the mature CFL woodpecker habitats on National Forest lands on Montague Island would be harvested under the action alternatives (Table 4-22). Snag densities decline heavily following timber harvest. Woodpecker densities are likely to decline proportionally to the decrease in snag densities under each alternative. However, Management Area Wide Standards and Guidelines for snag retention will reduce effects. Impacts from any action alternative to woodpecker populations are expected to be insignificant.

### **Cumulative Effects of Forest Service and Private Timber Harvest**

From 20 to 24 percent of the mature CFL woodpecker habitat on Montague Island and 32 to 40 percent on south Montague would be harvested as a result of both Forest Service and private proposed actions (Table 4-23). It is unknown whether snags would be left in harvested areas on private lands.

### **Long-Term Effects of Timber Harvest**

Sixty-five percent of the CFL in woodpecker habitats would be in second growth if all the suitable timber on National Forest lands is harvested (Table 4-24). Implementation of any alternative, in association with extensive private harvest, would result in the long-term reduction in habitat capability for woodpeckers on Montague Island. Current populations appear to be well below what is expected based on habitat capability.

## **4 Environmental Consequences**

### **Effects of Roads and Humans**

The effect of roads and trails on woodpecker habitat should be insignificant. Firewood cutting near cabins and campsites may reduce available snags, especially under alternative 5. However, roads and trails would provide increased opportunities to observe woodpeckers and other cavity nesters.

**4-22 Acres of mature CFL woodpecker habitat proposed for harvest on Forest Service and private land on Montague Island, by alternative**

| Affected Area   | Mature CFL ** at 1989 | Mature CFL Harvest 1989-1999 ** |   |     |   |      |   |     |   |      |    |
|-----------------|-----------------------|---------------------------------|---|-----|---|------|---|-----|---|------|----|
|                 |                       | 1                               |   | 2   |   | 3    |   | 4   |   | 5    |    |
|                 |                       | Ac.                             | % | Ac. | % | Ac.  | % | Ac. | % | Ac.  | %  |
| Montague Island | 21,455                | 0                               | 0 | 777 | 4 | 1014 | 5 | 999 | 5 | 1151 | 5  |
| South *         |                       |                                 |   |     |   |      |   |     |   |      |    |
| Montague        | 10,827                | 0                               | 0 | 777 | 7 | 1014 | 9 | 999 | 9 | 1151 | 11 |
|                 |                       |                                 |   |     |   |      |   |     |   | 1219 | 6  |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest lands only.



## 4-23 Acres of mature CFL woodpecker habitat proposed for harvest on Forest Service and private land on Montague Island, by alternative

| Affected Area    | Mature CFL ** at 1989 | Mature CFL Harvest 1989-1999 ** |    |       |    |       |    |       |    |       |    |
|------------------|-----------------------|---------------------------------|----|-------|----|-------|----|-------|----|-------|----|
|                  |                       | 1                               |    | 2     |    | 3     |    | 4     |    | 5     |    |
|                  |                       | Ac.                             | %  | Ac.   | %  | Ac.   | %  | Ac.   | %  | Ac.   | %  |
| Montague Island  | 27,710                | 5,486                           | 20 | 6,263 | 23 | 6,500 | 23 | 6,485 | 23 | 6,637 | 24 |
| South * Montague | 16,970                | 5,486                           | 32 | 6,263 | 37 | 6,500 | 38 | 6,485 | 38 | 6,637 | 39 |
|                  |                       |                                 |    |       |    |       |    |       |    | 6,705 | 40 |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest, State selected and private lands.

## 4-24 Acres of 1947 mature CFL woodpecker habitat remaining on Montague Island at the end of the rotation

| Affected Area    | Mature CFL ** at 1947 | End of Rotation All Alternatives Acres ** % |
|------------------|-----------------------|---|
| Montague Island  | 30,729                | 10,698 35                                   |
| South Montague * | 18,333                | 6,188 34                                    |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.  
 \*\* Acres of mature commercial forest on National Forest, State selected and private lands.

## **Common Mergansers**

### **General Effects of Timber Harvest**

Common merganser habitat for this analysis is defined as the commercial forest and unproductive forest in Stream Habitat Zones. These zones, as defined in Appendix E, contain all forested habitat within 100' of anadromous fish streams and include forested land types that potentially contain coho rearing habitat. Availability of juvenile salmon coupled with large trees that provide nesting cavities are important components of nesting and brood rearing habitat (Wood 1986).

Voles are generally associated with early successional stage habitats. Initial surveys on Montague Island have identified dry muskeg and uplifted beach as supporting voles, however, surveys have been very limited (Steiner and Giezentanner, 1987).

Effects on Montague vole habitat is likely limited to road construction activities on uplifted beach habitats. Alternative 6 builds the greatest amount of road on the uplifted beach, followed by Alternatives 5 and 4 and Alternatives 3 and 2.

## **Coordinated Management**

Alternative 1 assumes no further National Forest development in the Management Area until the Forest Plan revision. There would be no opportunities to coordinate management given the objectives of this alternative. Two LTFs and two logging camps would be built on private land.

Alternatives 2 and 3 provide for limited coordinated management with adjacent land-owners. The effects of this lack of coordination would be:

1. Increased cost for development of separate road and LTF facilities. Since development costs are not shared, there would be a duplication of some facilities and mobilization costs. Unit costs would be increased because of a loss of economy of scale from the separate road and LTF facilities. This is especially evident in the duplication of log transfer facilities.

2. Environmental effects would be increased by construction of three separate LTFs compared to two in Alternative 1 and one in Alternatives 4, 5 and 6.

Alternative 4, 5 and 6 would provide for coordinated management with adjacent land-owners. The effects of this would be:

1. Reduced cost to the public and the private sector resulting from economies of scale and shared road and LTF development costs. This results in a positive present net value for all National Forest resources.

2. Adverse environmental effects to National Forest land would be increased over alternatives 1-3 by increases in roading and timber harvest.

3. Adverse effects on the marine and visual resources resulting from construction and operation of one LTF would be less than Alternatives 1, 2 and 3.

#### 4-25 Acres of mature CFL common merganser habitat proposed for harvest on Montague Island, by alternative

| Affected Area   | Mature CFL ** at 1989 | Mature CFL Harvest 1989-1999 ** |   |     |   |     |   |     |    |     |    |
|-----------------|-----------------------|---------------------------------|---|-----|---|-----|---|-----|----|-----|----|
|                 |                       | 1                               |   | 2   |   | 3   |   | 4   |    | 5   |    |
|                 |                       | Ac.                             | % | Ac. | % | Ac. | % | Ac. | %  | Ac. | %  |
| Montague Island | 3634                  | 0                               | 0 | 54  | 1 | 173 | 5 | 232 | 6  | 400 | 11 |
|                 |                       |                                 |   |     |   |     |   |     |    | 375 | 10 |
| South *         |                       |                                 |   |     |   |     |   |     |    |     |    |
| Montague        | 1992                  | 0                               | 0 | 54  | 3 | 173 | 9 | 232 | 12 | 400 | 20 |
|                 |                       |                                 |   |     |   |     |   |     |    | 375 | 19 |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest lands only.

#### 4-26 Acres of mature CFL common merganser habitat proposed for harvest on Forest Service and private land on Montague Island, by alternative

| Affected Area   | Mature CFL ** at 1989 | Mature CFL Harvest 1989-1999 ** |    |       |    |       |    |       |    |       |    |
|-----------------|-----------------------|---------------------------------|----|-------|----|-------|----|-------|----|-------|----|
|                 |                       | 1                               |    | 2     |    | 3     |    | 4     |    | 5     |    |
|                 |                       | Ac.                             | %  | Ac.   | %  | Ac.   | %  | Ac.   | %  | Ac.   | %  |
| Montague Island | 6,582                 | 2,819                           | 43 | 2,873 | 44 | 2,992 | 45 | 3,051 | 46 | 3,219 | 49 |
|                 |                       |                                 |    |       |    |       |    |       |    | 3,194 | 49 |
| South *         |                       |                                 |    |       |    |       |    |       |    |       |    |
| Montague        | 4,914                 | 2,819                           | 57 | 2,873 | 58 | 2,992 | 61 | 3,057 | 62 | 3,219 | 66 |
|                 |                       |                                 |    |       |    |       |    |       |    | 3,194 | 65 |

\* Includes ADF&G Game Management Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest, State selected and private lands.



## 4 Environmental Consequences

4-27 Acres of 1947 mature CFL common merganser habitat remaining on Montague Island at the end of the rotation

| Affected Area    | Mature CFL ** at 1947 | End of Rotation All Alternatives Acres ** % |    |
|------------------|-----------------------|---|----|
| Montague Island  | 8,520                 | 1322  | 16 |
| South Montague * | 5,758                 | 974   | 17 |

\* Includes ADF&G Game Managment Unit 6, subunits 35, 36 and 37. See Map 2.

\*\* Acres of mature commercial forest on National Forest, State selected and private lands.

4. Alternative 5 provided opportunities to coordinate recreation facilities and services between the Forest Service and private landowners.

5. In Alternatives 4 and 5 the route of the arterial road provides for the best access to National Forest resources.

## Timber

### General Effects on Timber Stand Productivity

Under alternative 1, timber stand productivity would remain static for the planning period.

All action alternatives (2-6) would result in an increase in timber productivity due to the conversion of mature and over-mature, uneven-aged, climax stands to more productive even-aged, second growth stands. Presently, annual growth is offset by mortality in these stands such that net growth is zero (Hutchinson and LaBau 1975). In contrast, second growth stands on a 100 year rotation on an average site in the management area (site index 90) will produce about double the cubic foot volume maintained in most mature to over-mature stands (Taylor 1934). Based on the amount of acres converted to second growth, alternative 6 would increase timber stand productivity the most followed by alternatives 5, 3, 4, 2, and 1.

Growing sites are improved and made more favorable for Sitka spruce when excessive accumulation of raw humus is reduced (Ruth and Harris 1979). Large quantities of nutrients tied up in the organic matter are made available to growing plants only through decomposition, a process which works best at warm temperatures (Harris and Farr 1974). Humus build-up is reversed when the site is exposed to full sunlight after logging. All action alternatives would result in decreased levels of humus accumulation.

Under all action alternatives, an additional increase in the production of merchantable wood is expected from precommercially thinning 1968 acres of second growth stands on the west side of Montague Island. The Forest Plan estimated that precommercial thinning between an age of 10 to 20 years would increase timber harvest volume in future rotations by 3.3 thousand cubic feet (MCF) per acre on an average site.

### Long-term Effects on Timber Stand Productivity

Eighty percent (1,568 acres) of the proposed precommercial thinning acreage would be thinned under a wildlife-visual/timber prescription to benefit wildlife. This prescription calls for tree spacings of 16-20 feet which is wider than the normal 10-14 foot spacing that is used to maximize timber production. The expected long-term effect of this action would be that projected timber yields would not be realized at the end of the normal 100 year rotation and thus the rotation would have to be extended to 120 - 150 years depending on the actual tree spacing used and site indices of the individual stands to thinned.

### **General Effects of Windthrown Timber and Salvage of Windthrown Timber**

The management area is subject to strong windstorms year round from the Gulf of Alaska, which often results in timber windthrow. Windthrow is a natural occurrence in the management area but it can be intensified where timber has been exposed to man-caused openings.

Stand examinations conducted during the 1988 field season revealed concentrated areas of blowdown around the mouth of Strike Creek located in the southeast corner of Montague Island and in several stands located in the area around the headwaters of the Nellie Martin River.

Under alternative 1, there would be no increase in the potential for additional windthrown timber over what occurs naturally. In addition, without access roads there would be no potential for salvaging existing or future blowdown.

Under all action alternatives (2-6), proposed timber harvest would emphasize salvage of both existing and future windthrown timber. Due to the amount and proposed location of access roads, the opportunity to salvage existing and future blowdown would be best under alternative 5, followed by alternatives 6, 4, 3, and 2.

Not all of the identified windthrow in the south Montague Island area would be salvaged due to other resource considerations and economics. It is assumed that this timber will have no commercial value beyond the ten-year life of this plan due to wood fiber deterioration. Unharvested windthrow may impede natural regeneration of commercial tree species and be detrimental to other resource values. In addition, windthrown timber can provide breeding habitat for insects and diseases.

Under all action alternatives, it is assumed that proper design and layout of harvest units using established standards and guidelines contained in this document will be effective in establishing windfirm boundaries so as to minimize the potential for windthrown timber in adjacent unharvested stands.

### **General Effects of Isolating Timber Stands**

Stands of timber can be isolated, or be made difficult to access in an economic and physical sense. An example of isolation of timber stands is when harvest units are designed and laid out without adequate consideration for the future access of adjacent timber. Designing a unit for a highlead logging operation where terrain and resource protection considerations would allow a longer reach skyline system to be used, often isolates timber. The consequences of isolating timber may include the following:

Additional roading with its associated costs and environmental impacts may be required in the future to access timber which could have been reached from one road with a complete setting. When additional road construction is not feasible, aerial logging systems, such as helicopter, may be required in the future to access isolated timber.

The short-term operating costs of logging partial settings may be reduced, but the long-term costs may increase substantially if isolated timber is eventually harvested.



To facilitate the development of harvest alternatives and to prevent the isolation of timber stands, a Logging Systems Transportation Analysis was used for the south Montague Island area. The Logging System Transportation Analysis identifies where the operable CFL is and identifies the logging system settings and road networks required to access the operable CFL.

The CFL and operable CFL acreages for the project area were determined by incorporating timber inventory and Logging Systems Transportation Analysis inventories into a computerized Geographic Information System (GIS).

Standard logging practices in southeast Alaska and Prince William Sound require setting boundaries to be placed in logical locations dependent upon topography and the type of logging system. Windfirm cutting boundaries were used where possible to minimize future windthrow. Aerial photography, topographic maps, and ground reconnaissance were used to develop the Logging Systems Transportation Analysis.

Harvest units were developed for each action alternative (2-6) by selecting combinations of settings and roads. As alternatives were developed, adjustments were made to settings and road locations on the basis of resource protection considerations. Additional minor adjustments to unit design are expected to occur as units and roads are laid out to meet on-the-ground conditions and to meet mitigation requirements.

#### **CFL on Montague Island Placed in a Wildlife Habitat Retention Prescription**

Under all action alternatives, 964 acres of commercial forest land on Montague Island (see Maps Q-V) containing an estimated 23 MMBF of sawtimber would be designated as retention for wildlife habitat. This action would reduce the amount of commercial forest land on Montague Island that would be available for timber management by 4.0 percent or 1.8 percent for the management area.

#### **CFL on Classified as Unsuitable due to Fisheries Concerns**

Under all action alternatives, 708 acres of commercial forest land in the management area containing an estimated 17.6 MMBF of sawtimber is classified as unsuitable for timber management because of fisheries concerns. These are commercial forest stands that are extensively braided by stream channels of variable widths which are classified as anadromous fish habitat. This classification would reduce the amount of commercial forest land available for timber management by 1.3 percent for the management area.

#### **CFL on Green Island Placed in a Research Natural Area**

Under all alternatives, 956 acres of commercial forest land on Green Island (see Map G) containing an estimated 25.5 MMBF of sawtimber would be designated as a Research Natural Area. This action would reduce the amount of commercial forest land available for timber management on Green Island by 50.7 percent and 1.8 percent for the management area.

#### **CFL on Hinchinbrook Island Placed in a Primitive ROS class**

Under all alternatives, Hinchinbrook Island would be managed as a Primitive ROS class for the planning period. This action would remove 22,947 acres of commercial forest land on Hinchinbrook Island containing an estimated 391.5 MMBF of sawtimber from

consideration for timber management during the planning period. However, only 15,014 acres of the 22,947 acres of CFL would be classified as suitable CFL at this time. As a result, this action would reduce the amount of commercial forest land available for timber management by 28.5 percent for the management area.

#### **Suitable Forest Land (SFL)**

Under alternative 1, no suitable commercial forest land would be harvested during the planning period. Action alternatives 2 through 6 propose to harvest from 5.6 to 8.7 percent of the 13,950 acres of suitable commercial forest land on Montague Island within the next ten years, or 4.3 to 6.8 percent of the 17,897 acres of suitable commercial forest land within the management area.

#### **Overview of Timber Economic Analysis Methodology**

For reader clarification, Chapter 4 contains two different economic analyses that are designed to provide different viewpoints of the economic aspects for the proposed alternatives.

The first analysis, located here in the timber Section, is a financial or appraisal analysis of the proposed timber sale for each alternative. It provides a comparison of the relative economic efficiency of the proposed timber sale for each alternative.

The second analysis is located in the socio-economic section of this chapter. It is a Present Net Value (PNV) analysis which analyzes all costs and benefits of proposed projects, fish projects, wildlife projects, road and LTF development, timber harvest, and precommercial thinning). It provides a comparison of the relative overall economic efficiency of each alternative.

#### **Financial Analysis of Proposed Timber Harvest Alternatives**

In the development of timber harvest alternatives for the south end of Montague Island, a financial analysis of each alternative was performed. The purpose of the financial analysis is to provide a means of comparing the short-term costs and revenues of each alternative under a mid market condition.

The data used to develop selling values and manufacturing costs for mid market conditions is based on historical appraisal data from the Alaska Region of the Forest Service. The mid market condition is defined as follows:

The value and product mix that most closely matches half the absolute difference between the quarter with the highest appraisal values for end product selling price, and the quarter with the lowest appraisal values for end product selling price, during the past 10 years. Value and product mix are measured by the R-10 Index Operation and adjusted to current dollars. Appraisal data for Mid Market is Base Year 1987, adjusted to the third quarter of 1988.

Timber values are related to a) prevailing market conditions and the international demand for the cants and pulp produced after local processing; b) the volume class distribution since logs from low volume stands tend to have lower value than those from high volume stands; and c) species and grade composition.



## 4 Environmental Consequences

After the all-time poor market conditions that occurred in the early 1980's, market conditions for Alaska timber have improved steadily. The market at this time is continuing to improve and is considered to be slightly above a mid-market condition. For this analysis, species composition and grade estimates were obtained from an analysis of all previous timber sales on Montague Island.

The costs of timber harvesting are directly influenced by a) the volume class distribution in each alternative since low volume stands are more expensive to harvest due to lower volumes per acre and smaller logs; b) the method, or logging system, used to yard the timber; and c) road and LTF development costs.

Harvest costs developed for this analysis were based on Alaska Region appraisal data adjusted to 1987 (FSH 2409.22 AMD 82) for each logging system. Log transfer site and road construction costs were developed based upon historical cost averages from southeast Alaska incurred under similar conditions to those on Montague Island and in Prince William Sound.

Only short term direct values and costs associated with timber harvest were used. The timber values reflected in this analysis do not represent gross or net returns to the government.

The road system developed in each action alternative is a capital investment that is attributed to timber harvest for each alternative in the financial analysis. But the road system, while considered a short-term cost in this financial analysis, is also a benefit because the road network is in place for future timber transport, forest management and public use. Therefore, some portion of the timber costs reflected in Tables 4-28 and 4-29 could actually be attributed to future timber harvest and management.

The financial analysis was performed using two different sets of roading assumptions or scenarios.

Under scenario 1, it was assumed that the Forest Service would build all specified roads attributed to timber harvest under all action alternatives.

Scenario 2 considered the Chugach Alaska Corporation (CAC) request for access to its lands via an arterial road to be built from MacLeod Harbor to Patton Bay. Since this road would also facilitate timber management on Forest Service lands, scenario 2 evaluated the economic effects a cost share agreement between the Forest Service and CAC would have on Forest Service timber harvest costs and values.

For the purpose of this analysis, it was assumed that a cost share agreement could be made for building the arterial road under alternatives 4, 5, and 6. Cost shares would be pro-rated on the basis of timber volume that would be served by the arterial road for each ownership. This scenario assumes the Forest Service share of the arterial road would be 37 percent and the CAC share would be 63 percent of the total arterial road cost.



#### 4-28 Direct timber harvest values and costs for Scenario One on Montague Island

|                    | 1 | 2              | 3            | ALTERNATIVE    |                | 5              | 6 |
|--------------------|---|----------------|--------------|----------------|----------------|----------------|---|
|                    |   |                |              | 4              |                |                |   |
| Total Timber Value | 0 | \$ 6,899,517   | \$10,176,746 | \$ 9,414,592   | \$11,840,195   | \$12,019,139   |   |
| Total Timber Costs | 0 | \$ 8,141,237   | \$10,746,624 | \$11,395,738   | \$13,132,415   | \$13,627,586   |   |
| Net Value          | 0 | (\$ 1,241,720) | (\$ 569,878) | (\$ 1,981,146) | (\$ 1,292,220) | (\$ 1,608,447) |   |

#### 4-29 Direct timber harvest values and costs for Scenario Two on Montague Island

|                    | 1 | 2              | 3            | ALTERNATIVE  |              | 5            | 6 |
|--------------------|---|----------------|--------------|--------------|--------------|--------------|---|
|                    |   |                |              | 4            |              |              |   |
| Total Timber Value | 0 | \$ 6,899,517   | \$10,176,746 | \$ 9,414,592 | \$11,840,195 | \$12,019,139 |   |
| Total Timber Costs | 0 | \$ 8,141,237   | \$10,746,624 | \$ 8,887,966 | \$10,601,247 | \$11,047,932 |   |
| Net Value          | 0 | (\$ 1,241,720) | (\$ 569,878) | \$ 526,626   | \$ 1,238,948 | \$ 971,207   |   |

## 4 Environmental Consequences

Tables 4-28 and 4-29 summarize the results of the financial analysis. The values and costs used for the analysis may differ from the values and costs used to determine the final appraisal rates at the time the timber sale is offered. Actual appraised rates will be determined by using appraisal data in effect at the time of appraisal.

The costs and values in these tables provide a means of comparing the short-term costs and revenues of the alternatives relative to each other under a mid market condition. They are not absolute values of net stumpage for each alternative due to the uncertainty of projecting future timber market levels. The cost differences between alternatives are due to differing volume class distributions, logging systems, and transportation systems in each alternative. The analysis covers only the short term direct costs and values associated with the timber harvest identified in each alternative.

As displayed in Table 4-28, all of the action alternatives show a negative net value for the mid market condition and would require supplementation of funds to offset the cost of road building. Alternative 1 has the best net value under scenario 1. Alternatives 3, 2, 5, 6, and 4 rank in order of decreasing economics second, third, fourth, fifth, and sixth respectively.

As displayed in Table 4-29 which assumes a cost share arrangement for construction of the arterial road, the most economical timber sale program for the mid market condition is Alternative 5 followed by Alternative 6 and then Alternative 4.

### **Regeneration**

Law, regulation, and policy require that timber be harvested from National Forest System land only where there is assurance that such land can be adequately restocked within 5 years after final harvest. This may be accomplished by natural or artificial regeneration. Based on past experience, the Forest Service estimates that thirty percent of the acres proposed for harvest under all action alternatives would need to be artificially regenerated with the remaining seventy percent being regenerated naturally.

### **Cumulative Effects of Past Harvest and Proposed Harvest**

Most of the past timber harvest within the management area has taken place on Montague Island. Clearcutting has been used exclusively as the silvicultural harvest system. Since 1947, 8 percent of the CFL on Montague Island has been harvested by this silvicultural system.

Changes in the CFL size class distribution for Montague Island resulting from the proposed timber harvest in this entry are displayed in Table 4-30.

#### 4-30 Changes in CFL-size class acres on Montague, by alternative

| Size Class                    | Current<br>Acres | ALTERNATIVES |        |        |        |        |
|-------------------------------|------------------|--------------|--------|--------|--------|--------|
|                               |                  | 1            | 2      | 3      | 4      | 5      |
| Seedling/Sapling              | 2,053            | 2,053        | 2,830  | 3,067  | 3,052  | 3,204  |
| Mature/Overmature             |                  |              |        |        |        |        |
| Sawtimber                     | 22,465           | 21,465       | 21,688 | 21,451 | 21,466 | 21,314 |
| Acres Proposed<br>for Harvest |                  | 0            | 777    | 1,014  | 999    | 1,151  |
|                               |                  |              |        |        |        | 1,219  |

#### 4-31 Estimated fuel consumption on Montague Island, by alternative

| Fuel<br>Consumption | 1 | 2       | Alternatives |         |         |
|---------------------|---|---------|--------------|---------|---------|
|                     |   |         | 3            | 4       | 5       |
| Gallons First Entry | 0 | 269,365 | 354,085      | 385,817 | 445,445 |
|                     |   |         |              |         | 456,467 |



## 4 Environmental Consequences

### Energy Requirements

Energy consumption is based on a projection of gallons of gasoline and diesel fuel needed as follows:

Timber sale preparation and administration: 0.5 gallons/MBF

Logging and water transportation: 5.0 gallons/MBF

Road construction: 4,000 gallons/mile

Road maintenance: 20 gallons/mile

Other energy needs are estimated to be insignificant.

The estimated energy consumption represented by the proposed actions is displayed in Table 4-31.

### Irreversible and Irretrievable Commitment of Resources

Irreversible commitment of resources refers to resources that are renewable only over a long period of time, such as soil productivity, or to nonrenewable resources, such as cultural resources or minerals.

Irretrievable commitment of resources is the production or use of renewable resources that is lost because of allocation decisions. It represents opportunities foregone for the period of time that the resource cannot be used.

Timber on commercial forest land that would not be harvested due to poor soil stability, slopes greater than 75 percent, wildlife habitat maintenance, fisheries concerns, economic considerations, designation as a natural research area, or management in primitive ROS class represents irretrievable commitments. The commitment is irretrievable rather than irreversible because future technological advances or drastic market increases could make harvest of these areas possible and feasible. Table 4-32 displays the acreage and volume of commercial timber on national forest land within the management area which could be irretrievably committed to other uses for the foreseeable future under the action alternatives (2-6). These commitments may be changed as a result of future land management planning.

### Adverse Environmental Effects Which Cannot Be Avoided

Implementation of Alternative 1 would not result in any adverse environmental effects.

Implementation of any of the action alternatives (2-6) would result in some adverse environmental effects which cannot be avoided. However, application of standard protection measures and contract requirements limit the extent, duration, and intensity of those effects. The following are areas in which adverse effects would be expected to occur:

- An increase in sedimentation resulting from soil disturbance and road construction.
- A change in the natural scenic quality due to vegetation management and road construction.
- Changes in wildlife habitat from mature, climax stands to second growth stands.

**MONITORING**

Monitoring will be done during and after implementation of all management activities. During sale and road layout, all specialists indicating an interest in a specific area will be given the opportunity to review locations in the field prior to completion of the fieldwork. Following field layout, harvest unit and road cards showing the specific locations will be filled out by the sale layout crew supervisor. They will be reviewed by each specialist and compared to the proposed location in the Final EIS to assure no significant change in impacts on resources has occurred. Specialists' comments will be recorded on each harvest unit and road segment card, noting differences in what was proposed in the Final EIS and what was laid out.

If it is determined that actual impacts will differ from those described in the Final EIS, supplemental NEPA documentation will be completed.

During road construction and harvest operations, Forest Service inspectors will be on site to monitor progress and document resource impacts. Any proposed changes will be reviewed by all specialists prior to implementation to assure that no significant change in impacts occurs when compared to impacts documented in the Final EIS. Inspectors will notify specialists if impacts appear to be nearing unacceptable levels during operations. Inspection reports filed after every visit will document current activity and impacts that occurred. They will also estimate activities to occur in the near future so that specialists can be on hand to observe work in critical areas.

Following completion of harvest activity, the harvest unit and road will be reviewed and compared to the Final EIS to determine if any significant changes were made during the operations from what was planned. This review will also be done by each specialist and documented on the harvest unit and road cards.

4-32 National Forest CFL acres and volume irretrievably committed

| CFL LAND DESIGNATIONS   | HINCHENBROOK |       | HAWKINS |      | GREEN |      | MONTAGUE |       | TOTAL MA |         | % TOTAL MA |       |
|-------------------------|--------------|-------|---------|------|-------|------|----------|-------|----------|---------|------------|-------|
|                         | ACRES        | MMBP  | ACRES   | MMBP | ACRES | MMBP | ACRES    | MMBP  | ACRES    | MMBP    | ACRES      | MMBP  |
| PRODUCTIVE FOREST (CPL) | 22,947       | 391.5 | 3,767   | 65.2 | 1,886 | 48.0 | 24,164   | 578.3 | 52,764   | 1,083.0 | 100.0      | 100.0 |
| UNSTABLE SOILS          | 332          | 5.6   | 0       | 0.0  | 0     | 0.0  | 2,794    | 64.9  | 3,126    | 70.5    | 5.9        | 6.5   |
| SLOPES > 75 %           | 5,678        | 107.6 | 321     | 6.0  | 27    | 0.6  | 3,668    | 93.9  | 9,694    | 208.1   | 18.4       | 19.2  |
| WILDLIFE HABITAT        | 0            | 0.0   | 0       | 0.0  | 0     | 0.0  | 964      | 23.0  | 964      | 23.0    | 1.8        | 2.1   |
| FISH HABITAT            | 286          | 5.2   | 0       | 0.0  | 16    | 0.5  | 406      | 11.9  | 708      | 17.6    | 1.3        | 1.6   |
| LONG-TERM ECONOMICS     | 1,637        | 25.6  | 322     | 5.2  | 64    | 1.9  | 2,382    | 62.7  | 4,405    | 95.4    | 8.4        | 8.8   |
| RNA                     | 0            | 0.0   | 0       | 0.0  | 956   | 25.5 | 0        | 0.0   | 956      | 25.5    | 1.8        | 2.4   |
| ROS PII                 | 15,014       | 247.5 | 0       | 0.0  | 0     | 0.0  | 0        | 0.0   | 15,014   | 247.5   | 28.5       | 22.9  |
| TOTAL UNSUITABLE        | 22,947       | 391.5 | 643     | 11.2 | 1,063 | 28.5 | 10,214   | 256.4 | 34,867   | 687.6   | 66.1       | 63.5  |



## Recreation

### Common to All Alternatives

Under all 5 action alternatives, there would be a general shift from primitive to motorized recreation opportunities on the south part of Montague Island as would be expected when roads provide access to areas which were previously unroaded. Hunter access to the interior and alpine areas of south Montague would be improved with the proposed roads and trails. Primitive conditions would be maintained on Hinchinbrook, Hawkins, and Green Islands. Additional developed facilities are proposed at varying levels and most are proposed for the south end of Montague Island. All alternatives expect an increase in visitor use for this part of Prince William Sound and an emphasis is placed on helping the public understand low impact techniques for Montague Island.

Two factors which are important when evaluating the alternatives for the recreation resource are: 1) whether they meet the amended Forest Plan goals for recreation and 2) whether they meet the Management Areawide goals for recreation.

The recreation management goals for the Big Islands area include:

1. Increase developed and dispersed recreation opportunities
2. Enhance marine recreation opportunities
3. Maintain dispersed recreation opportunities
4. Emphasize Primitive and Semi-primitive non-motorized recreation

Alternative 1 meets the Forest Plan goals to maintain dispersed recreation opportunities and emphasizes primitive and semi-primitive non-motorized recreation.

The action alternatives, 2-6, meet the first three recreation goals through the proposal of recreation projects shown on the Alternative maps, J through O. These range from recreation cabins to anchor buoys to new trails and the alternatives vary by degree of development. The fourth goal is also met in all action alternatives through the maintenance of primitive conditions on the north end of Montague, Hinchinbrook, Hawkins, Green, Little Green Islands, and The Needle, and the addition of 20,000 to 30,000 acres of semi-primitive non-motorized recreation on South Montague.

The Forest Plan also required an evaluation of the feasibility of establishing a system of marine recreation areas that is compatible with the State's Marine Park System. The primary objective of each area is to maintain natural appearing landscapes and recreation settings. These areas may or may not surround suitable small boat anchorages but would provide marine recreation opportunities. Some of those areas identified in the Forest Plan and the State Prince William Sound Area Plan and/or which were located in areas considered for development, were placed under the Marine Recreation Prescription. This prescription provides for maintaining the qualities which constitute a marine recreation setting. Excellent opportunities for marine recreation occur on the north end of Montague. Marine recreation prescriptions were applied to Rocky Bay, Zaikof Bay, Stockdale Harbor and Port Chalmers for Alternatives 2-6 (see Map V). Other areas identified in the Forest Plan for marine recreation systems include Gibbon

## 4 Environmental Consequences

Anchorage on Green Island, Double/Anderson Bay and Constantine Harbor on Hinchinbrook Island. These areas were not assigned a marine recreation prescription because no activities were proposed.

The amended Forest Plan required that Hinchinbrook Island be managed consistent with maintaining Primitive ROS class (formerly Primitive II) conditions until the Plan is revised (Maps 16 and 28). All alternatives including No Action meet the conditions specified in the Forest Plan for Primitive ROS class conditions. Projects which would result in altering the Primitive recreation setting are not recommended for Hinchinbrook Island. The new public recreation cabin recommended for Shelter Bay is consistent with the Forest Plan. Alternatives 2-6 recommend that all motorized use on National Forest System lands between Boswell Bay and Hook Point be prohibited.







# DRAFT

## BIG ISLANDS MANAGEMENT AREA HINCHINBROOK ISLAND PORTION

### RECREATION OPPORTUNITY SPECTRUM ALTERNATIVES 2 - 6



#### LEGEND

-  Pristine
-  Primitive
-  Rural
-  Private Ownership
-  Land Selection Boundary
-  Ownership Boundary

SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 16, 1989



## 4 Environmental Consequences

The Forest Plan also required that "current recreation use and other pertinent data from the Forest Service Recreation Information Management (RIM) and other sources will be incorporated into the analysis." This requirement was met.

Direction from Management Area wide standards and guidelines include:

Increase and enhance a variety of recreation opportunities with an emphasis on making the management area more accessible and usable.

Recognize the significance of existing recreation uses such as hunting, fishing, beach combing, camping and boating. Maintain highly attractive recreation settings that continue these uses.

All action alternatives increased recreation opportunities and emphasized making the area more accessible and usable. Opportunities for improving access included constructing roads and trails, providing boating facilities and improving airstrips where practical. A road along the south end of Montague was a major contribution to improving access.

Significant factors in the evaluation of the recreation resource are:

1. recreation settings for the key recreation complexes
2. the ROS classes
3. recreation visitor use levels

Analysis of the recreation resource identified three existing recreation complexes on south Montague as key recreation areas enjoyed by the majority of the visitors to south Montague. These are San Juan Bay, Stump Lake and Nellie Martin River. In addition, Jeanie Cove was identified as an excellent location for a new recreation complex because of the wheeled landing on the beach and the excellent beachcombing, hunting and fishing opportunities.

Conditions which comprise the desired recreation opportunity are maintained in all alternatives for Stump Lake and Jeanie Cove with the exception of Alternative 6 for Jeanie Cove. Somewhat less than desirable conditions are expected as a result of the proposed road for San Juan Bay and Nellie Martin River. More detail is found in the discussion under each alternative.

Recreation prescriptions in the alternatives were used to provide standards and guidelines for those areas which were identified as: 1) key recreation complexes - areas which include excellent recreation opportunities and/or high public use; 2) unique recreation settings or opportunities and which were located where other resources had proposed projects which might alter the setting.

Semi-primitive non-motorized (SPNM) prescriptions were applied to a number of areas along the inside coast of Montague Island. One area is the lagoon south of Port Chalmers which has been identified as a potential site for a public recreation cabin. Since pre-commercial thinnings are planned nearby, this prescription will maintain the desired recreation setting. Between the Lagoon and Hanning Bay, a number of beaches used by kayakers for camping were identified as unique opportunities for the

Big Islands area. These recreation settings would be maintained by the application of SPNM in the areas proposed for pre-commercial thinnings. A primitive recreation setting would be maintained at Stump Lake and Jeanie Cove (except in Alternative 6) by prescribing Semi-primitive non-motorized recreation. In alternative 6, the road would be within 1/2 mile of the proposed recreation cabin, so semi-primitive motorized is prescribed at Jeanie Cove. Maintaining the current conditions at Stump Lake is important because it includes two very desirable public recreation cabins and it is the only lake providing floatplane access on south Montague. Jeanie Cove is unique and significant because it is located on the Gulf side of Montague and so offers excellent beachcombing opportunities.

One other small area of SPNM recreation is prescribed around the recreation cabin at Nellie Martin River to maintain the non-motorized setting. It was recognized that ATV users would use the foot trail from the beach landing to the cabin to connect with the arterial road, if no other provision was made. Therefore an ATV trail is proposed from the wheeled beach landing to connect with the main road which does not directly impact the Nellie Martin River cabin. Semi-primitive motorized recreation was prescribed at San Juan Bay, Nellie Martin River, and Beach River for Alternatives 2-6 and for MacLeod Harbor in Alternative 5. This was to maintain the recreation settings for those key recreation complexes.

The major change for Alternatives 2-6 in the ROS class is the change in south Montague Island from an unroaded to roaded area. In Alternatives 2 and 3, the Patton Bay to Cape Cleare area is unroaded. In Alternatives 4, 5, and 6, the roaded area includes the main transportation route from MacLeod Harbor to Patton Bay. For all of Big Islands, the change in number of Pristine and Primitive acres is not significant (see Table 4-33). Considering south Montague only (see Table 4-34), the change is dramatic (Maps 18-27).

The proposal to construct roads on south Montague could be viewed as having both positive and negative effects. Constructing the road around south Montague achieves the objective of making the management area more accessible and usable. It provides new opportunities for semi-primitive motorized recreation: a motorized route around the south end of the island improves hunter access to alpine areas. In addition, it provides a mix of recreation opportunities on the south end of Montague where it is currently heavily weighted toward Pristine and Primitive recreation opportunities. On the other hand, for those desiring to maintain all primitive areas, the road on south Montague could be viewed negatively. Table 4-33 below shows the number acres by ROS class as they change by alternative from the existing condition for the management area. Because the management activities primarily take place on the south end of Montague, Table 4-34 was prepared which shows the changes.

Estimated increases in use, as a result of proposed actions, were calculated for facilities and projects such as new recreation cabins and trails. Increases resulting from project proposals were then summarized by activity (See the recreation chart Table 4-35). In addition, increases as a result of other proposed activities such as the improved access, expansion of overnight lodging at MacLeod Harbor, ATV rental operation, boat dock facility for 60 passenger boats were calculated and added to the increase in

## **4** Environmental Consequences

recreation use. Use increases were not calculated at full capacity of the facility, but rather at the expected use levels based on professional experience, expected use seasons, usable area, known access points, history of weather conditions and other factors specific to the Big Islands area.

Changes in recreation use for the Big Islands Management Area ranged from increases of 8% in Alternative 2 to over 100% for Alternative 5. See each individual alternative for more detail. An estimate of current use on south Montague is 12,600 RVD's. On south Montague only, Alternatives 2-6 would result in increases in recreation use of about 13%, 26%, 47% 218% and 46% respectively.



#### 4-33 Change in ROS class by alternative

| <u>ROS Classes</u>                   | <u>Existing<br/>Acres</u> | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> |
|--------------------------------------|---------------------------|----------|----------|----------|----------|----------|----------|
| Pristine<br>(formerly Primitive I)   | 194,129                   | 194,129  | 180,147  | 180,147  | 180,147  | 179,969  | 180,147  |
| Primitive<br>(formerly Primitive II) | 32,968                    | 32,968   | 60,884   | 60,884   | 38,038   | 38,038   | 38,038   |
| Semi-Primitive<br>Non-motorized      | 90,430                    | 90,430   | 77,227   | 75,047   | 86,603   | 83,588   | 86,637   |
| Semi-Primitive<br>Motorized          | 21,752                    | 21,752   | 13,059   | 16,169   | 15,107   | 17,829   | 15,000   |
| Roaded Modified                      | 9,748                     | 9,748    | 9,778    | 9,778    | 9,778    | 9,778    | 9,778    |
| Roaded Natural                       | 0                         | 0        | 7,719    | 6,789    | 19,142   | 19,615   | 19,214   |
| Rural                                | 529                       | 529      | 739      | 739      | 739      | 739      | 739      |

Table 4-33, Changes in ROS Class by Alternative for Big Islands shows that the number of Primitive acres doubles for 2 and 3, even though the southwest part of Montague becomes roaded. This is because, under alternatives 2-6, Hinchinbrook Island will be managed as Primitive as specified under the Settlement Agreement. For Primitive acres in 4, 5 and 6, the numbers reflect the entire part of south Montague being roaded, but taking into account the aforementioned. Semi-primitive Non-motorized (SPNM) appears to be reduced slightly (from 5-15%) for 4, 5 and 6 and 2 and 3 respectively. The downward trend for all action alternatives results from the SPNM on Hinchinbrook changing to Primitive and averaging out is due to the Primitive on south Montague going to SPNM. Changes in the Semi-primitive motorized section are due to the same reasons as those shown for SPNM. Roaded Natural changes reflect the arterial road location.

## 4-34 Change in ROS class on south Montague Island, by alternative

| <u>ROS Classes</u>                   | <u>Existing<br/>Acres</u> | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> |
|--------------------------------------|---------------------------|----------|----------|----------|----------|----------|----------|
| Pristine<br>(formerly Primitive I)   | 56,201                    | 56,201   | 2,056    | 2,056    | 2,056    | 1,877    | 2,056    |
| Primitive<br>(formerly Primitive II) | 3,950                     | 3,950    | 22,693   | 22,693   | 2,237    | 1,464    | 1,464    |
| Semi-Primitive<br>Non-motorized      | 4,951                     | 4,951    | 26,336   | 26,336   | 34,338   | 32,760   | 28,685   |
| Semi-Primitive<br>Motorized          | 505                       | 505      | 7,502    | 7,502    | 7,104    | 9,161    | 4,715    |
| Roaded Modified                      | 616                       | 616      | 647      | 647      | 647      | 647      | 647      |
| Roaded Natural                       | 0                         | 0        | 6,789    | 6,789    | 19,641   | 20,113   | 28,456   |
| Rural                                | 78                        | 78       | 288      | 288      | 288      | 288      | 288      |

Table 4-34, Changes in ROS class by Alternative for South Montague, shows that the existing condition is primarily Pristine and Primitive conditions (about 90%) and about 8% is SPNM. Alternatives 2 thru 6 reduce Pristine by 98% and Primitive is reduced by half for Alternatives 4-6. Alternatives 2 and 3 show an increase in Primitive by 6 times and this reflects the change from Pristine to Primitive. The increases shown for SPNM is due to the same change. Semi-primitive motorized acres increase significantly and this reflects the new recreation opportunity afforded by the transportation system. Roaded Natural also reflects the arterial road location.

#### 4-35 Increases in recreation use by alternative

| RVD's <u>1/</u>                     |                    |          |          |          |            |             |           |
|-------------------------------------|--------------------|----------|----------|----------|------------|-------------|-----------|
| <u>Type of Use</u>                  | <u>Current Use</u> | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u>   | <u>5</u>    | <u>6</u>  |
| Recreation Cabin                    | 4600               | -        | 276      | 426      | 276        | 1626        | 426       |
| Hunting & Fishing<br>(Recreational) | 4000               | -        | 200      | 912      | 1152       | 9984        | 1490      |
| Water Sports                        | 10200              | -        | 100      | 144      | 144        | 324         | 144       |
| Camping                             | 500                | -        | 607      | 677      | 927        | 8433        | 777       |
| Hiking                              | 600                | -        | 559      | 1195     | 2777       | 941         | 2732      |
| Semi-Primitive<br>Motorized         | -                  | -        | 192      | 292      | 489        | 5040        | 489       |
| Other <u>2/</u>                     | <u>4600</u>        | <u>-</u> | <u>-</u> | <u>-</u> | <u>501</u> | <u>2282</u> | <u>50</u> |
| Total                               | 24500              | -        | 1934     | 3646     | 6266       | 28630       | 6108      |

1/ Recreation Visitor Days (RVD's). An RVD is 1 visitor for 12 hours or 12 visitors for one hour or any combination.

2/ Other includes viewing scenery, tour boats, etc.



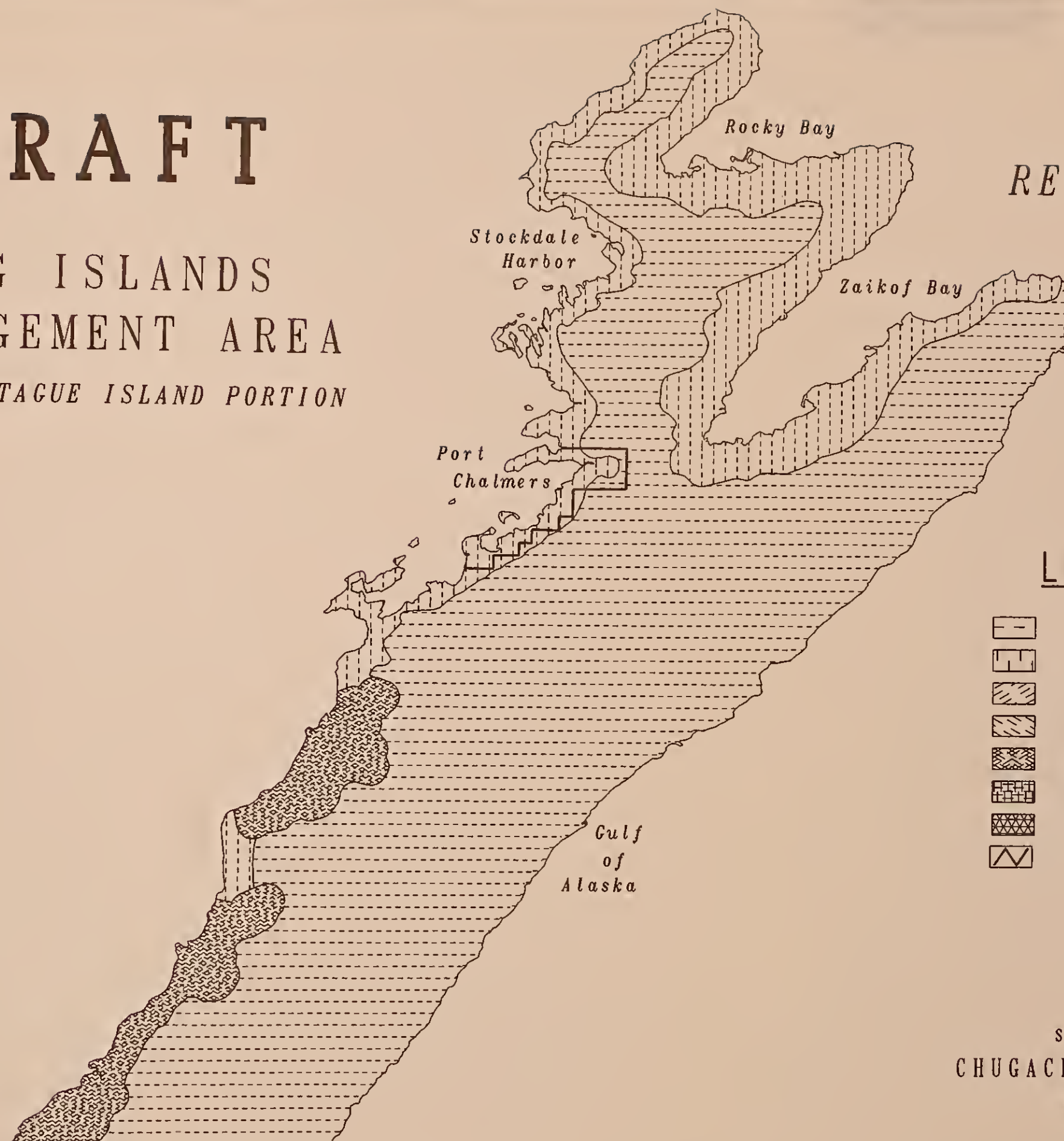


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



## BIG ISLANDS MANAGEMENT AREA NORTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM

ALTERNATIVE 2



### LEGEND

-  PRISTINE
-  PRIMITIVE
-  SEMI-PRIMITIVE NONMOTORIZED
-  SEMI-PRIMITIVE MOTORIZED
-  ROAD MODIFIED AREA
-  ROADED NATURAL
-  RURAL
-  STATE SELECTION BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989

# TABLE

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RESULTS OF THE  
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EARTHQUAKE  
OF  
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## BIG ISLANDS MANAGEMENT AREA









SOUTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM

ALTERNATIVE 2



### LEGEND

-  PRISTINE
-  PRIMITIVE
-  SEMI-PRIMITIVE NONMOTORIZED
-  SEMI-PRIMITIVE MOTORIZED
-  ROAD MODIFIED AREA
-  ROADED NATURAL
-  RURAL
-  OWNERSHIP BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989

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1876

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1878

1879

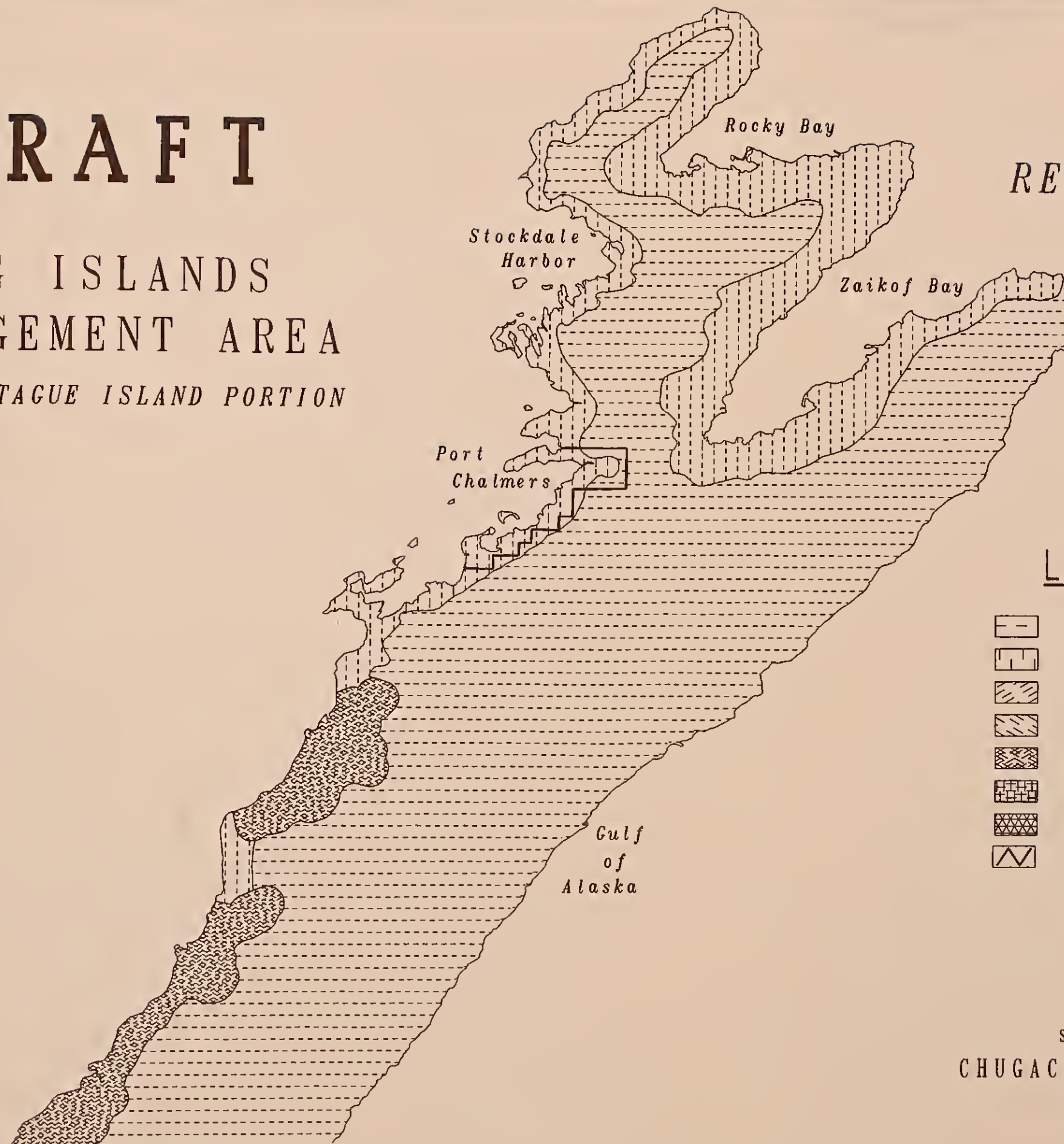
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## BIG ISLANDS MANAGEMENT AREA

NORTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM

ALTERNATIVE 3



### LEGEND

- PRISTINE
- PRIMITIVE
- SEMI-PRIMITIVE NONMOTORIZED
- SEMI-PRIMITIVE MOTORIZED
- ROAD MODIFIED AREA
- ROADED NATURAL
- RURAL
- STATE SELECTION BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989



1924

1924

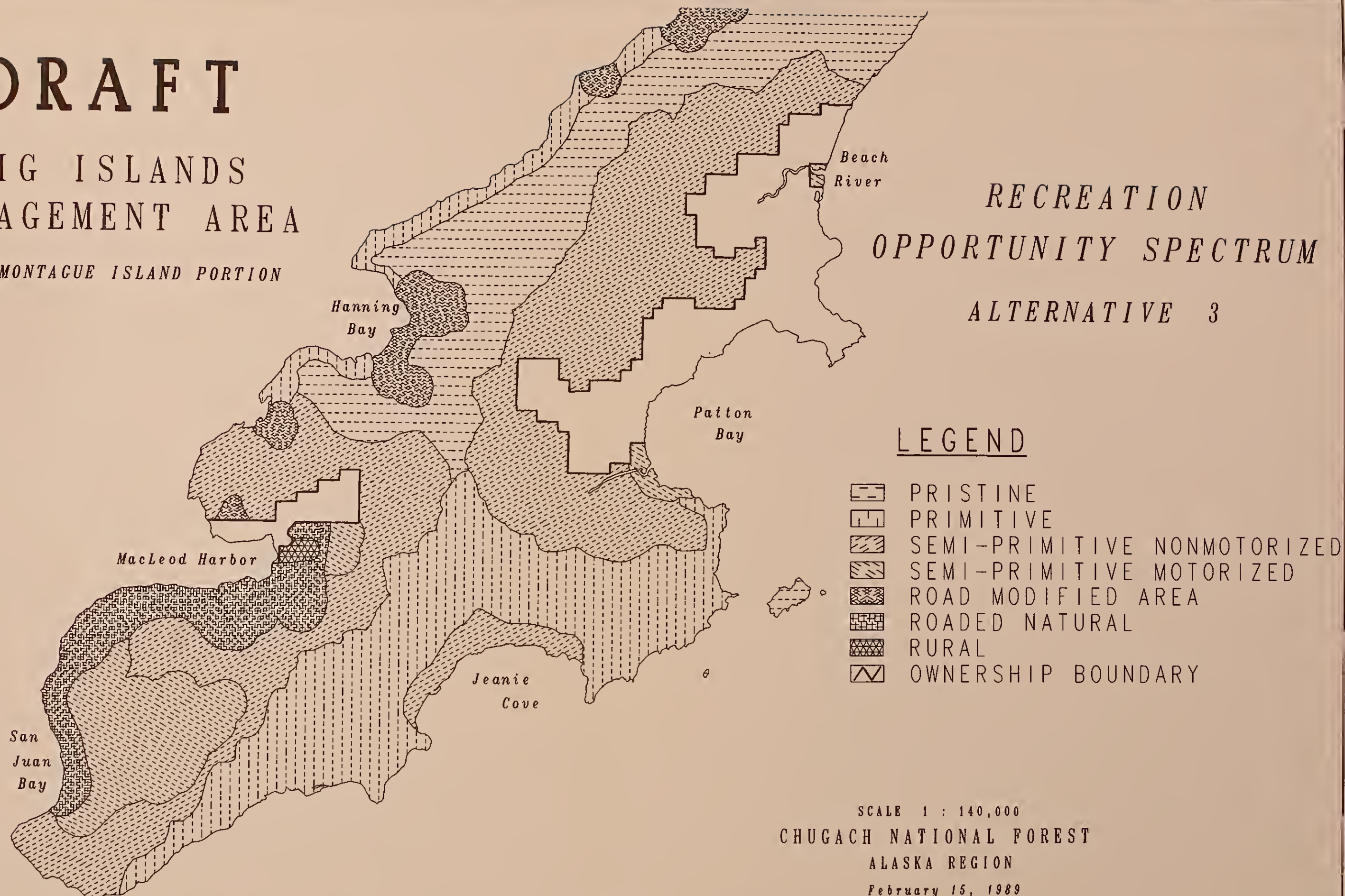
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## BIG ISLANDS MANAGEMENT AREA

SOUTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM

ALTERNATIVE 3



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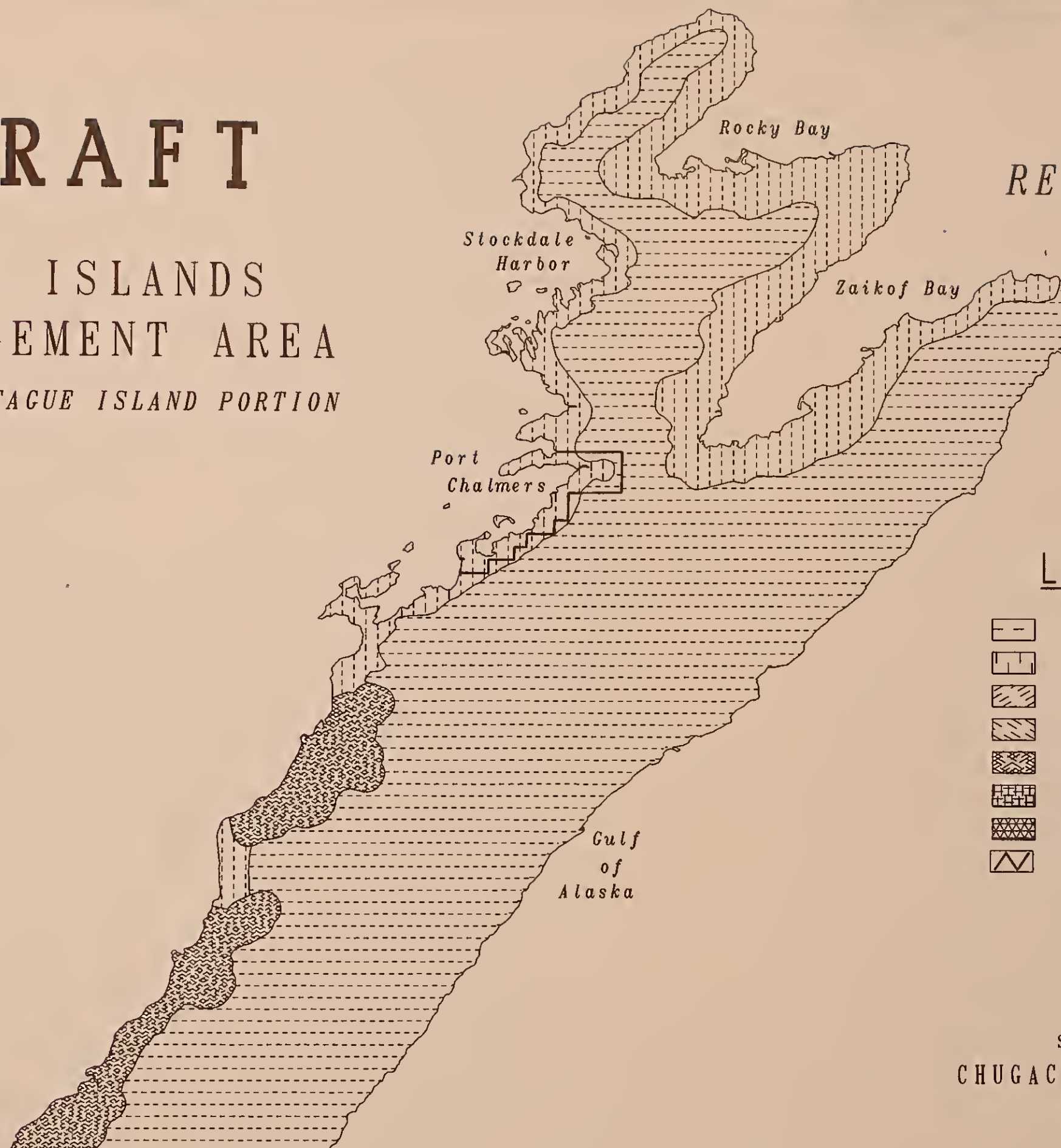


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






## BIG ISLANDS MANAGEMENT AREA NORTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM

ALTERNATIVE 4



### LEGEND

-  PRISTINE
-  PRIMITIVE
-  SEMI-PRIMITIVE NONMOTORIZED
-  SEMI-PRIMITIVE MOTORIZED
-  ROAD MODIFIED AREA
-  ROADED NATURAL
-  RURAL
-  STATE SELECTION BOUNDARY

SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 15, 1989

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1848









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## BIG ISLANDS MANAGEMENT AREA

SOUTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM ALTERNATIVE 4

### LEGEND

-  PRISTINE
-  PRIMITIVE
-  SEMI-PRIMITIVE NONMOTORIZED
-  SEMI-PRIMITIVE MOTORIZED
-  ROAD MODIFIED AREA
-  ROADED NATURAL
-  RURAL
-  OWNERSHIP BOUNDARY



SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 15, 1989



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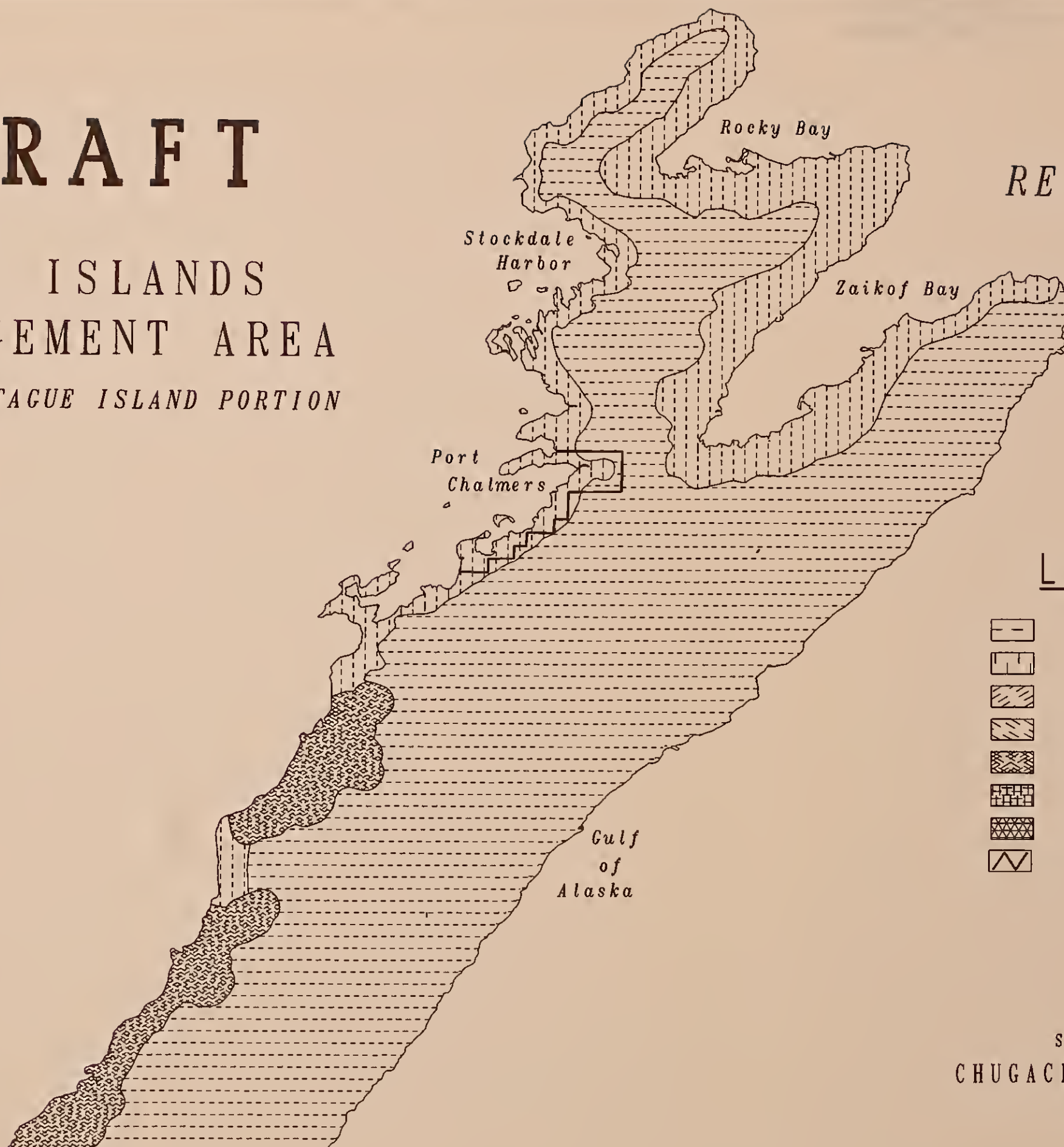
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## BIG ISLANDS MANAGEMENT AREA NORTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM

ALTERNATIVE 5



### LEGEND

- PRISTINE
- PRIMITIVE
- SEMI-PRIMITIVE NONMOTORIZED
- SEMI-PRIMITIVE MOTORIZED
- ROAD MODIFIED AREA
- ROADED NATURAL
- RURAL
- STATE SELECTION BOUNDARY

SCALE 1 : 140,000  
CHUGACH NATIONAL FOREST  
ALASKA REGION  
February 15, 1989

# THE HISTORY OF

THE CITY OF  
NEW-YORK  
FROM THE FIRST SETTLEMENT  
TO THE PRESENT TIME



# DRAFT

## BIG ISLANDS MANAGEMENT AREA

SOUTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM

ALTERNATIVE 5



### LEGEND

- |  |                             |
|--|-----------------------------|
|  | PRISTINE                    |
|  | PRIMITIVE                   |
|  | SEMI-PRIMITIVE NONMOTORIZED |
|  | SEMI-PRIMITIVE MOTORIZED    |
|  | ROAD MODIFIED AREA          |
|  | ROADED NATURAL              |
|  | RURAL                       |
|  | OWNERSHIP BOUNDARY          |

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989

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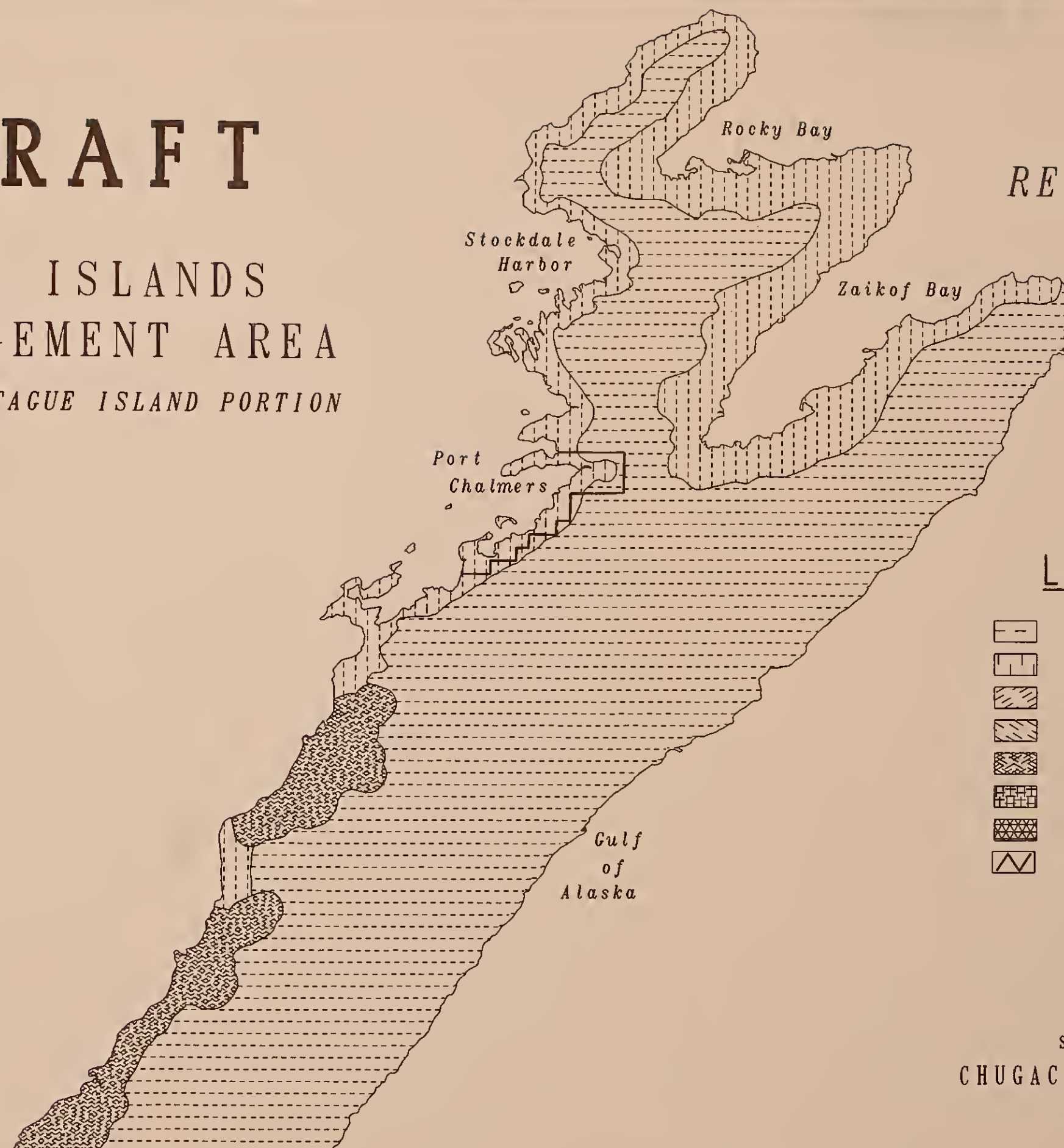


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## BIG ISLANDS MANAGEMENT AREA NORTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM

ALTERNATIVE 6



### LEGEND

-  PRISTINE
-  PRIMITIVE
-  SEMI-PRIMITIVE NONMOTORIZED
-  SEMI-PRIMITIVE MOTORIZED
-  ROAD MODIFIED AREA
-  ROADED NATURAL
-  RURAL
-  STATE SELECTION BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989



14495

# DRAFT

## BIG ISLANDS MANAGEMENT AREA









SOUTH MONTAGUE ISLAND PORTION

## RECREATION OPPORTUNITY SPECTRUM

ALTERNATIVE 6



### LEGEND

-  PRISTINE
-  PRIMITIVE
-  SEMI-PRIMITIVE NONMOTORIZED
-  SEMI-PRIMITIVE MOTORIZED
-  ROAD MODIFIED AREA
-  ROADED NATURAL
-  RURAL
-  OWNERSHIP BOUNDARY

SCALE 1 : 140,000

CHUGACH NATIONAL FOREST  
ALASKA REGION

February 15, 1989





As described earlier, the major effect of the transportation system is to shift from primitive to motorized recreation. The arterial road provides for semi-primitive motorized recreation, opportunities for easy access to saltwater and connections from recreation cabins to the road. In addition, the local road systems provide for semi-primitive motorized recreation to access the alpine areas and some additional fishing access.

Natural appearing recreation settings are maintained for Hinchinbrook, Hawkins, and Green Islands and the north end of Montague Island in all alternatives. The precommercial thinnings proposed in the old clearcut areas on the inside coast of Montague would not impact the recreation settings for the camping beaches used by kayakers.

The effects on the recreation setting for San Juan Bay, which includes a popular recreation cabin, vary by alternative. None of the action alternatives maintain a natural appearing recreation setting. One of the reasons for locating many of the harvest units on the hillside rather than the valley bottoms was to protect and maintain fish and wildlife habitat. Maintenance of the recreation setting (of which visuals are an integral part) would have required harvesting in less seen areas (some of those areas are valley bottoms). More detail on the effect of timber harvesting on the visual resource can be found in the Visual Resource section of Environmental Consequences.

Most of the wildlife and fisheries activities center around maintenance of existing habitat. For the most part, these activities are highly compatible with recreation objectives since an important part of recreation on south Montague is hunting and fishing. As a rule, those activities which benefit wildlife populations and increase sport fishing opportunities are beneficial to recreation. As mentioned in the previous section, one exception is San Juan Bay where maintaining the visual setting conflicts with maintaining fish and deer habitat.

Prescriptions for riparian and beach fringe areas maintain recreation values.

The effects of activities on adjacent private land are most noticeable for the proposed timber harvest in the Patton Bay area. Based on the same assumptions outlined in the Wildlife section of this document, the Beach River cabin viewshed and therefore the recreation setting will be adversely affected by the planned private timber harvest activities. Effect on the wildlife/fisheries populations is detailed in the Wildlife/Fisheries section.

Since all alternatives propose activities which would increase use and since some concerns were expressed by the public as to potential degradation of the environment as a result of this increased visitor use, the following projects are proposed and included in alternatives 2-6:

The development of an Information and Education program which focuses on "low impact techniques" for recreation visitor use in Prince William Sound. Possible facets of the program are the development of a brochure and/or video on the subject, development of a cadre of speakers to present programs to user groups on the subject (environmental, hunting, fishing, marine recreation and school groups), development of a cadre of volunteers to help spread the word through visitor contacts during the high use season and use of partnerships to fully develop and implement the program. For

## 4 Environmental Consequences

example, several organized user groups have expressed interest in developing such a program directed at kayakers and small boaters. Such a program could add to the experience gained from the 1988 cooperative projects with the Prince William Sound Users Association.

Scoping efforts for this MAA proposal revealed some concern over the garbage which is left by many visitors to the Big Islands area. Since weather conditions often do not allow users to burn their refuse, another solution to the accumulation of garbage is needed. An existing Forest Service program which needs to become fully operational in Prince William Sound is the "Pack it In, Pack it Out Program" which encourages users to take out their own refuse. No garbage facilities are planned for existing or proposed developed recreation facilities (except in large scale facilities proposed in alternative 5) or for dispersed areas. The program could be extended to include the air charter pilots who transport visitors to and from the area.

Monitoring of recreation use is provided for in the Forest Plan on pg. IV - 12,13. No additional direction is needed. Monitoring of the natural setting is provided for in the MAA-wide standards and guidelines for Visual Resources .

### **Alternative 2**

The recreation prescriptions for Alternative 2 provide for a semi-primitive motorized recreation experience in the San Juan Bay cabin area and maintain the qualities of semi-primitive non-motorized recreation on the rest of south Montague, namely Jeanie Cove, Stump Lake and Nellie Martin.

The major change in recreation opportunities on south Montague for Alternative 2 is the reduction of Pristine and Primitive acres by 60%, and the addition of 6800 acres of Roded Natural, 7500 acres of Semi-primitive Motorized and 26,000 to semi-primitive Non-motorized.

Recreation use levels increase by about 8% or 1900 RVD's. About 25% is due to improved access resulting from the presence of the road from McLeod Harbor to San Juan Bay, approximately 38% is due to additional developed facilities and the remainder is attributed to enhancement of dispersed recreation opportunities and rehabilitation of existing facilities.

New recreation opportunities include two recreation cabins, one at Jeanie Cove and one at Shelter Bay on Hinchinbrook Island, and an anchor buoy at Zaikof Bay. Semi-primitive motorized recreation would be available along the new road system from MacLeod Harbor to San Juan Bay. The result is an increase of about 20% in the amount of National Forest system lands on south Montague accessible to visitors.

Timber harvest units were selected along the road from McLeod Harbor to San Juan Bay and on the slopes viewed from the new location of the San Juan Bay recreation cabin. Therefore a natural appearing setting is maintained on only one hillside, the north side. Two key recreation complexes are not affected.



### **Alternative 3**

The effect on the key recreation complexes is the same as for Alternative 2 except that the adverse effect on the San Juan Bay area is more severe and there is an increase in the amount and type of additional recreation opportunities offered at San Juan Bay.

The changes in recreation opportunities are similar to those described for Alternative 2.

Recreation use levels increase by about 15% or 3600 RVD's. About 13% is due to improved access resulting from the presence of the road from McLeod Harbor to San Juan Bay, about 25% due to increases in fishing and hunting opportunities, and approximately 60% is attributed to additional developed facilities and the enhancement of dispersed recreation opportunities.

Additional recreation opportunities include those mentioned for Alternative 2, new fishing and hiking opportunities in the MacLeod Harbor and at San Juan Bay areas, a tent platform at San Juan Bay and three locations for saltwater access facilities. Four wheel drive and ATV opportunities are increased along the proposed road, particularly in the San Juan Bay area. Access to National Forest land on south Montague is increased by about 30%.

Timber harvest units were selected to avoid key wildlife and fisheries habitat in San Juan Bay but this resulted in adverse impacts to the viewshed and the recreation setting. Alternative 3 results in the greatest impact to the visual resource because both hillsides visible from the recreation cabin include the greatest number of harvested acres. This is described in more detail in the Visual Resources section.

### **Alternative 4**

The recreation prescriptions provide a semi-primitive motorized recreation experience in the San Juan Bay cabin area and maintain the qualities of semi-primitive non-motorized recreation at Stump Lake and Jeanie Cove and in the immediate area of the Nellie Martin River cabin.

The major change in recreation opportunities for south Montague Island is the reduction of Pristine and Primitive acres by 93%, and the addition of about 20,000 acres of Roaded Natural and 7100 acres of Semi-Primitive Motorized recreation. As mentioned earlier in the Common to Alternatives section, this can be put in perspective by looking at the entire Management Area and all of Montague Island. For this alternative, there are just over 50% of the total acres in Pristine and Primitive for the entire Management Area and about 64% of Montague Island is in Pristine and Primitive.

Recreation use increases by about 25% or 6200 RVD's. About 35% of this increase is attributed to the arterial road, 19% is due to improved hunter access to alpine areas and the remainder are increases as a result of additional facilities including recreation cabins, tent platforms and trail construction.

New recreation facilities include those indicated for Alternative 3 and the following facilities in three key recreation complexes: Jeanie Cove (two recreation trails), Nellie Martin River (two tent platforms) and Stump Lake (two recreation trails connecting Stump Lake to Nellie Martin River area and the arterial road). Four interpretive sites are



## 4 Environmental Consequences

proposed near fish enhancement projects and near timber harvest units in riparian areas to interpret the multiple resource management.

The proposed transportation system increases opportunities for semi-primitive motorized recreation from MacLeod Harbor to Patton Bay and increases the amount of National Forest system lands accessible to visitors to about 70% for south Montague.

Key recreation complexes at Nellie Martin River, Stump Lake and Jeanie Cove would not be impacted by timber harvest. For San Juan Bay, the negative effects would be slightly less than for Alternative 3, and more than those in Alternative 2.

### **Alternative 5**

This alternative expands recreation services and facilities on south Montague Island more than other alternatives and involves the greatest change from the existing condition.

Changes in the acres of each ROS Class for Alternative 5 are very similar to those shown for Alternative 4. See Tables 4-33-34 for detailed information.

For the Big Islands area, recreation use would increase by about 115% or 28,630 RVD's. About 60% of this increase is attributed to expanded and additional overnight facilities at MacLeod Harbor, most of which would be accomplished through a partnership between the Forest Service and the private sector. 4300 RVD's, or 15% of the increase, is attributed to the new road and the remaining 7500, or 25% is expected as a result of the new recreation facilities. The total increase sounds quite large but that is only relative to the rather low use occurring now.

The estimate for increase in use due to new facilities did not assume full capacity (see Common to Alternatives section for discussion of this calculation). Most of the increased use is expected to occur on or near the facilities provided, i.e. trails, roads, campsites, lodge facilities, in the MacLeod Harbor to San Juan Bay area. Those facilities would include site hardening (extensive barrier work, etc.) where appropriate and would be constructed to a standard capable of handling the expected visitor use without adversely affecting the physical environment. A few areas of non-motorized use would involve barriers such as gates to prevent motorized use. These areas are designated in the transportation section. Some areas are expected to require barriers but the exact locations will be delineated during the construction phase. An example is the non-motorized lateral ridge trail where it joins the ATV trail.

Recreation opportunities are greatly increased under this alternative, and existing facilities are enhanced. Additional recreation cabins and tent platforms are added in response to the unfulfilled demand for this recreation opportunity. Hunter access to alpine areas is improved through the construction of short trails beginning at the termini of local roads. Fisherman access is enhanced thorough the construction of fisherman trails from road termini to streams. About 85% of the National Forest System land on south Montague is more accessible.

New recreation opportunities in Alternative 5 would be implemented through new Forest Service construction and also through partnerships. Projects likely to be Forest Service constructed facilities would include all the facilities proposed in Alternative 4

plus a 20 unit campground (with shelters) at MacLeod Harbor, 3 recreation cabins in the upper reaches of the Nellie Martin drainage and at least 2 and possibly 3 additional recreation cabins on the North end of Montague.

Other projects include expanding the overnight facilities in the MacLeod Harbor area and permitting other services such as ATV rentals, food and fuel sales/services, tour boat operations, flightseeing trips, and O/G operations including fishing and backpacking trips. Depending on the outcome of the feasibility study, the wheeled landing strip at MacLeod Harbor could be improved and maintained by private interest(s).

Traffic levels would be monitored to ensure that the road system can safely handle the additional recreation traffic as well as logging traffic. Once additional overnight lodgings are provided, the proposed projects designed to provide a recreation destination on southeast Montague would be initiated. These include the ATV trail from MacLeod Harbor to the connection with the arterial road in the upper reaches of Nellie Martin drainage, the lateral foot trail along the ridgeline from San Juan Bay to MacLeod Harbor and the interpretive facility for cultural resources at San Juan Bay.

There is the potential for conflict between the recreation traffic and logging traffic. This alternative predicts the largest increase in use, about 5000 RVD's of semi-primitive motorized recreation on an annual basis.

## **Alternative 6**

This alternative is similar to Alternative 4 in many respects with the major exception being the roading of the Jeanie Cove area. The similarities to 4 are in the effect on most key recreation complexes, the amount and location of new development and in the new recreation opportunities being offered. The difference is in the Jeanie Cove area which would not be maintained as primitive recreation since the road will extend to the beach and some harvest units will alter the natural setting.

The major change in recreation opportunities on south Montague Island is the reduction of Pristine and Primitive acres by 95% (28,400 acres to Roaded Natural and 4700 acres to Semi-Primitive Motorized). Again, this may be put into perspective by considering the entire Management Area in which case the reduction is about 40%.

Recreation use increases by about 25% or 6100 RVD's. About 35% of this increase is attributed to the arterial road, 19% is due to improved hunter access to alpine areas and the remainder are increases as a result of additional facilities including recreation cabins, tent platforms and trail construction.

New recreation opportunities are similar to those shown in Alternative 4 except for the Jeanie Cove area which has motorized access as well as additional spur roads and foot trails. About 75% of National Forest system land is more accessible.

## **Visual Resources**

The basic nature of the visual resource effects of implementing any of the action alternatives is a decrease in the degree to which the landscape appears to be natural and an increase in the degree to which it appears to be altered by man. The amounts of landscape alterations are quantified by tracking the acreage in each visual condition



## 4 Environmental Consequences

level resulting from implementation of the alternatives. Those Future Visual Conditions (FVC's) can then be compared to the two landscape management baselines, the adopted Visual Quality Objectives (VQO's) and the Existing Visual Conditions (EVC's) to assess the magnitude of the consequences.

Besides changes in visual conditions, another result of management activities would be the creation of new viewpoints, use patterns and use levels. Construction of new cabins, roads, trails, and other recreation facilities proposed in the various alternatives would generate new use that would change the inventoried sensitivity levels and distance zones. When the Forest Plan is revised, a new visual resource inventory will be conducted that would result in different visual quality objectives. For this planning period, VQO's will be retained as is for long-term direction. This analysis will note, however, levels of visual condition changes relative to viewpoints associated with possible new road locations. Because VQO's will not be revised as part of this planning effort, the consequences of the other resource management activities will not always be in keeping with the definitions of the VQO's.

The analysis will focus upon changes to the scenic quality of Montague Island and, in particular, upon changes to the south end of Montague. All acreages and data displayed are for Montague Island only. Unless otherwise noted, data also only applies to National Forest land on the island. Activities proposed for the remainder of the Management Area are much less significant in terms of both the quality and quantity of change in the landscape's natural character. The main body of the discussion also centers on the near-term effects of the alternatives. General long-term consequences are addressed under a separate heading.

Recreation facility developments are generally alterations that affect relatively few acres to a relatively slight degree. While one recreation cabin would be added at Shelter Bay (on Hinchinbrook Island) under Alternatives 2 through 6, the remainder of the recreation developments that would have any appreciable visual resource consequences would be located on Montague Island. A normal practice in cabin development is to select a relative inconspicuous site in which the cabin would not dominate a large natural setting. Thus it is estimated throughout the analysis that construction of each new cabin would result in no more than five acres being converted to FVC III. Tent platforms, tent pads, saltwater access points and shelters are also estimated to influence an area five acres in size and convert it to FVC III.

Since the trailhead parking areas proposed as part of alternatives 3 through 6 would be located in landscapes also altered by timber harvesting and roading, no additional assessment of acreage altered or levels of change in natural appearance was made in the data compiled for the tables below.

Construction of trails for nonmotorized use was assumed to leave the landscape with a natural appearance (FVC II). Thus, in landscapes whose EVC is level II through VI or in landscapes that would be modified by other management activities proposed herein, the trails were estimated not to impart any further visual resource consequences. In Alternatives 3 through 6, portions of the trails on both the north and south sides of San Juan Bay and portions of the trails between and around Nellie Martin River and Stump



Lake would be located in landscapes that are or would be visual conditions II to V anyway.

Two types of recreation facilities would only be developed under Alternative 5. The motorized trail over the crest of the island would create greater landscape alteration than the nonmotorized trail because of the additional width, grading and ground disturbance that would be associated with its construction and because of the steep, open ground it would traverse. Due to the open nature of much of the terrain that would be affected by the trail, a 200'-wide strip would be converted to FVC III. The other recreation facility exclusive to Alternative 5, the campground located around the southeast corner of MacLeod Harbor, would dominate 40 acres that would thus be altered to visual condition IV.

In total, new recreation facilities proposed in the action alternatives would add additional landscape alterations from 20 acres in Alternative 2 to 450 acres in Alternative 5. The recreation development that would create the greatest qualitative and quantitative modification would be the motorized trail found solely in Alternative 5. It would noticeably affect more acres (170) than any other recreation development and lower the visual condition of largely pristine, untouched mountainsides and ridgetops visible from a wide number of locations around MacLeod Harbor and San Juan Bay. Nonetheless, because those seen areas have Partial Retention VQO's, the affects of the trail would be in general compliance with the applicable VQO's.

Recreation development would cause very little acreage to not meet VQO definitions. The MacLeod Harbor campground, which would be constructed only in Alternative 5, would cause more (10) acres to deviate from Retention VQO's than any other proposed recreation development. The new San Juan Bay cabin location in Alternatives 3 through 6, the MacLeod Harbor boat ramp, and the Nellie Martin tent platforms and shelters would each affect about an acre of Retention landscape which would not meet that VQO direction by about one visual condition level. The trailheads above the east end of MacLeod Harbor and the north and south side of San Juan Harbor would all impact small areas in Partial Retention landscapes sufficiently to deviate from VQO direction by one level also. Alternative 5 would have the most acres not meeting VQO's because of recreation development; 17 acres would actually be altered beyond the threshold specified by Retention or Partial Retention direction. At the other end of the recreation development spectrum, Alternative 2 would create two acres of noncompliance in the course of providing recreation facilities. Acreage data for visual condition changes and areas not meeting VQO's are incorporated with the consequences of other resource management activities in the data tables found later in this section.

Timber harvesting and road construction on the south end of Montague Island that would occur under Alternatives 2 through 6 would alter the natural appearance of part of the area (Table 4-36). Alternatives 2-6 would also, to varying degrees, lessen the composite natural character of the viewsheds containing the activities. The cumulative effect of all harvest units and their associated transportation system would create the greatest qualitative and quantitative changes in visual conditions of all management activities (Table 4-37). Specific effects of timber harvest are addressed under each alternative.

## 4 Environmental Consequences

Log transfer facilities are a development associated with timber harvesting activities that would also generate landscape modifications. Each of the four alternative locations would have vegetative clearing, earthwork, and surfacing associated with the construction of the necessary ramps, pads and log storage areas. The ramp and turnaround pad associated with log transfer facilities would be the most prominent portions of the sites because of their greater exposure to more viewpoints in and around the water. Approximately 12 to 15 acres would actually be modified at any of the potential sites. There would be some slight variation in the visual resource consequences of the four sites but they would all basically dominate about a 50 to 60 acre portion of beach landscape and convert it to FVC V during operations and FVC IV after operations. All of the proposed locations are within Sensitivity Level 1 landscapes and would be visible from numerous locations around the affected waterbodies. Only two sites, south MacLeod Harbor and Wooded Island, are on National Forest land and therefore have adopted VQO's.

The log transfer facility site on the south side of MacLeod Harbor is in a Retention area. Relative to the north side site, it would have a longer ramp with a higher profile in comparison to the adjacent ground. Thus it would create a slightly more visible alteration of the landscape. It would still produce a landscape within the range defined by FVC IV, two visual condition levels of alteration greater than the FVC II needed to meet Retention. The A-frame facility design option for this site would create a higher profile landform modification than would the ramp-slide option but it would not be a sufficiently greater impact to give it a different FVC designation. During operation, the A-frame facility located prominently on the end of the ramp would be appreciably more visible than the ramp-slide operation.

The Wooded Island log transfer facility site is also in a Retention area. Because of the gentle grades off the coast, it would require the longest ramp of all the potential sites and the construction of a breakwater between Montague Island and Wooded Island. Neither landform would have a particularly high profile, however; the difference between this and the other sites would be more in terms of slightly more area impacted rather than an appreciable qualitative difference in visible impacts. Thus this alternative would produce about 5 more acres converted to FVC IV than would either of the MacLeod Harbor sites.

More significant than the variations between the sites would be the number of these LTF sites that would be developed under the various alternatives. Alternatives 2 and 3 would require three facilities--both sides of MacLeod Harbor and Box Point--while Alternatives 4 through 6 would only use the north MacLeod Harbor site. Alternative 1 would likely require two sites, the north side of MacLeod Harbor and Box Point. Alternative 1 would generate about 105 acres of FVC IV landscape dominated by LTF modifications. Alternatives 2 and 3 would have about 160 acres of FVC IV. Alternatives 4 through 6 would have about 60 FVC IV acres from LTF development.

For Alternatives 2 and 3, about 12 acres on the south side of MacLeod Harbor would not meet VQO definitions due to log transfer facility modifications. The sites associated with Alternative 1 and Alternatives 4 through 6 would be on private land without applicable VQO's.



Fish habitat enhancement projects are also planned as part of all the action alternatives. The most significant landscape disturbances would be associated with projects under consideration for MacLeod Harbor, San Juan Bay and Strike Creek. In total, 30 acres would actually be altered in these three projects. While these projects would modify the landscape (generally to FVC III) and while some of the stream channel projects would lower visual conditions (to II or III) over small areas, the overall visual resource consequences of fish enhancement projects are both qualitatively and quantitatively small in comparison to those of timber harvest activities. The two fisheries projects that would create the biggest disturbances, MacLeod Harbor and San Juan Bay, are common to all action alternatives. Of the remaining smaller impact projects, alternatives 2 and 3 propose fewer projects than alternatives 4 through 6. Thus fish habitat enhancement projects would be expected to reduce the natural character of Montague Island slightly more under Alternatives 4, 5, and 6 than under Alternatives 2 and 3. In the context of the entire island and the other proposed management activities, these alterations are relatively minor. The difference in modification levels between the two groups of alternatives is relatively slight as well.

Since the main landscape changes (from timber management activities and roading) would occur on the south end of Montague, recreation customers visiting that portion of the island would be the primary user group that would be affected. Hunters, anglers, campers, kayakers and other visitors to the harbors, cabins or new recreation facilities could see these new alterations. No alternative would create landscape alterations perceptible from the Alaska Marine Highway, cruise ship routes, or populated areas around Cordova. Thus, while Sensitivity Level 1 landscapes would be impacted in all the action alternatives, areas seen from the most important viewpoints with the highest visitation in and around the Management Area would not be affected by National Forest management activities.

Two Sensitivity Level 1 viewsheds would be affected by management activities on National Forest land in all action alternatives. Both MacLeod Harbor and San Juan Bay would have some level of landscape alteration in those alternatives. Two other Sensitivity Level 1 viewsheds, Patton Bay and Beach River, in addition to MacLeod Harbor, would be impacted by private land management activities.

Changes in visual condition levels are displayed below. Current acreages in each condition level can be compared to those expected to result from implementation of each alternative. Implementation generally results in fewer acres that appear to be natural landscapes (visual condition levels I and II) and more acres that have noticeable evidence of management activities (levels III through VI). Acres shown are for Montague Island only. Acres of change for the other portions of the management area will be minimal.

Based upon the data used to formulate the table 4-36, Table 4-38 lists the number of acres where the visual condition would decline (become less natural in appearance) subdivided by the number of levels of visual condition decline. Thus it gives an indication of the magnitude as well as the quantity of visual condition changes that would result from proposed management activities. Alternative 6 would generate the most acres whose appearance would become less natural.



## 4 Environmental Consequences

Tables 4-36 and 4-38 display changes to the visual condition of Montague Island. Since visual condition levels quantify degrees of natural landscape appearance, the effects upon the natural character of the MA can be extracted from this data. Acres that would retain a pristine or natural appearance after implementation are listed in FVC levels I or II respectively. Thus, after implementation, the natural character of the landscape would remain intact over the vast majority of Montague Island. Considering just National Forest management activities and the National Forest land base, the percentage of the land base that would be natural-appearing would range from 97.8% in Alternative 1 (which would maintain the status quo) to 93.4% in Alternative 6. Assessing both private land and National Forest activities on Montague Island, the range of change from the current situation (97.8%) spans from Alternative 1, which would maintain a natural appearance over 88% of the island, to Alternative 6, in which 83.9% of the island would stay natural in landscape character.

Since little appreciable change would occur to the remainder of the Management Area under any of the alternatives, and since their current character is largely natural in appearance, the proportion of the entire Management Area that would have a natural appearance would be even higher than the aforementioned percentages.

Visual Quality Indexes (VQI's) for each alternative are plotted in Figure 4-1. By comparing these indicators of composite scenic quality for Montague Island, one can see the limited difference between the alternatives and the current situation (EVC).

#### 4-36 Acres by future visual condition on National Forest land on Montague Island

| FVC | EVC     | ALTERNATIVES |         |         |         |         |         |
|-----|---------|--------------|---------|---------|---------|---------|---------|
|     |         | 1            | 2       | 3       | 4       | 5       | 6       |
| I   | 173,174 | 173,174      | 168,590 | 167,020 | 167,590 | 166,785 | 166,425 |
| II  | 13,207  | 13,207       | 12,473  | 12,448  | 11,448  | 11,528  | 11,488  |
| III | 3,332   | 3,332        | 4,432   | 5,047   | 7,107   | 7,702   | 7,212   |
| IV  | 786     | 786          | 5,006   | 5,986   | 2,936   | 3,266   | 4,516   |
| V   | 0       | 0            | 0       | 0       | 1,420   | 1,220   | 860     |
| VI  | 0       | 0            | 0       | 0       | 0       | 0       | 0       |

NOTE: Only changes in visual conditions that would result from management activities on National Forest System land are displayed in the table above. The table in the Cumulative Effects subsection shows how activities on both National Forest and private land would affect both National Forest and private lands.

#### 4-37 Acres by visual condition on Montague Island

| FVC | EVC     | ALTERNATIVES |         |         |         |         |         |
|-----|---------|--------------|---------|---------|---------|---------|---------|
|     |         | 1            | 2       | 3       | 4       | 5       | 6       |
| I   | 186,352 | 167,972      | 163,378 | 161,808 | 162,378 | 161,573 | 161,213 |
| II  | 15,871  | 14,171       | 13,435  | 13,410  | 12,410  | 12,490  | 12,450  |
| III | 3,830   | 3,370        | 4,471   | 5,086   | 7,146   | 7,741   | 7,251   |
| IV  | 786     | 786          | 5,006   | 5,986   | 2,936   | 3,266   | 4,516   |
| V   | 0       | 20,570       | 20,570  | 20,570  | 21,990  | 21,790  | 21,430  |
| VI  | 0       | 0            | 0       | 0       | 0       | 0       | 0       |

Visual Quality Indexes (VQI's) displaying the cumulative effects of each alternative upon the entire Montague Island landscape are shown in Figure 4-3. As compared to the VQI's for National Forest land (Figure 4-1), these indexes indicate that:

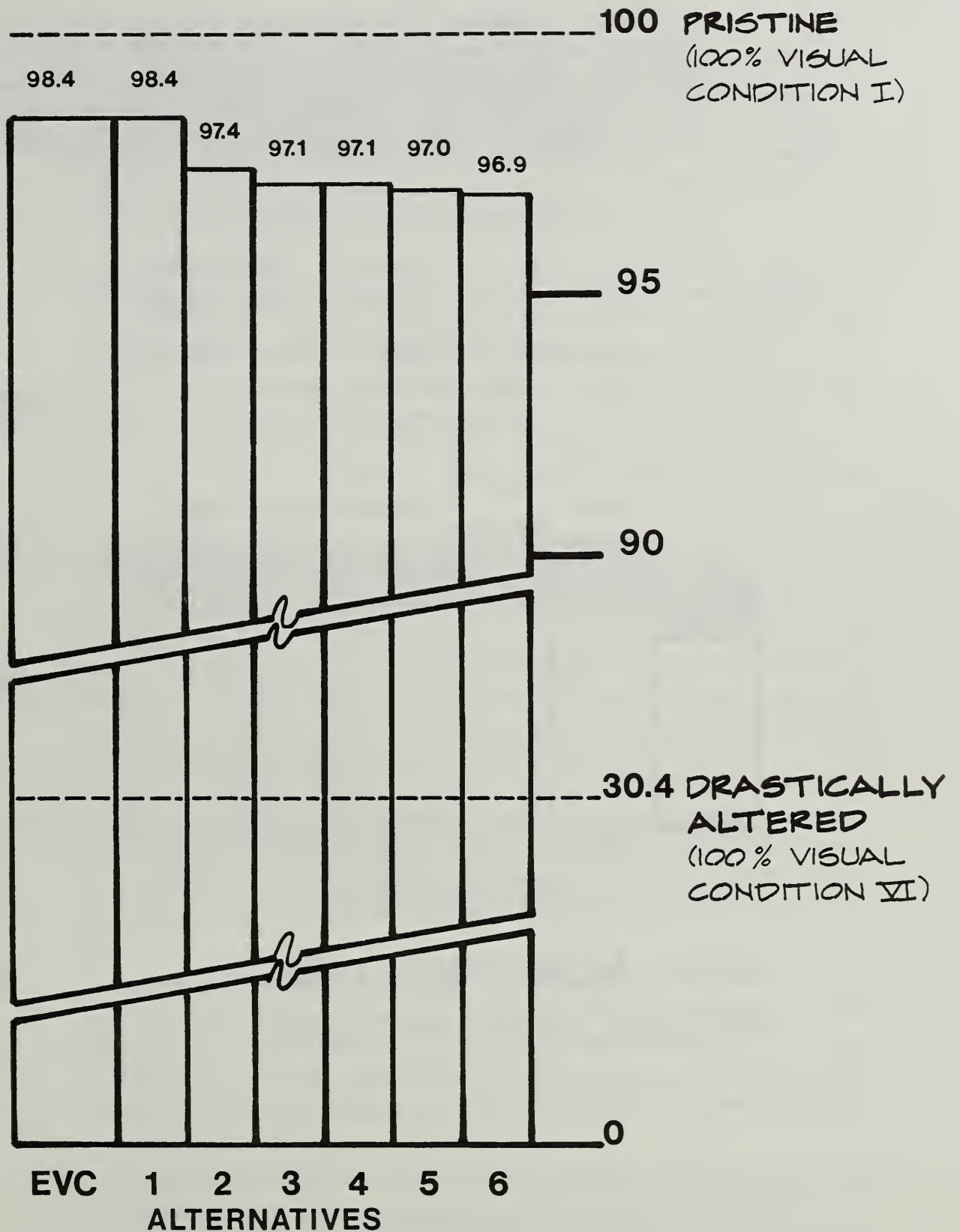
1. Including the effects of activities on private land causes a four-fold increase in the magnitude of change in the overall visual quality of Montague Island.
2. The island would still remain predominantly natural.

## 4 Environmental Consequences

4-38 Acres declining in visual condition, by levels of decline, resulting from activities on National Forest land on Montague Island

|   | ALTERNATIVES |       |       |       |       |       |
|---|--------------|-------|-------|-------|-------|-------|
|   | 1            | 2     | 3     | 4     | 5     | 6     |
| Levels of Decline   |              |       |       |       |       |       |
| 1   | 0            | 365   | 240   | 1,800 | 2,130 | 1,840 |
| 2   | 0            | 1,465 | 2,085 | 2,155 | 2,690 | 2,310 |
| 3   | 0            | 3,610 | 4,620 | 2,150 | 2,330 | 3,590 |
| 4   | 0            | 0     | 0     | 1,340 | 1,220 | 960   |
| TOTAL ACRES   | 0            | 5,440 | 6,945 | 7,445 | 8,370 | 8,530 |
| TOTAL as Percentage of Montague Island National Forest Land | 0%           | 2.9%  | 3.6%  | 3.9%  | 4.4%  | 4.5%  |





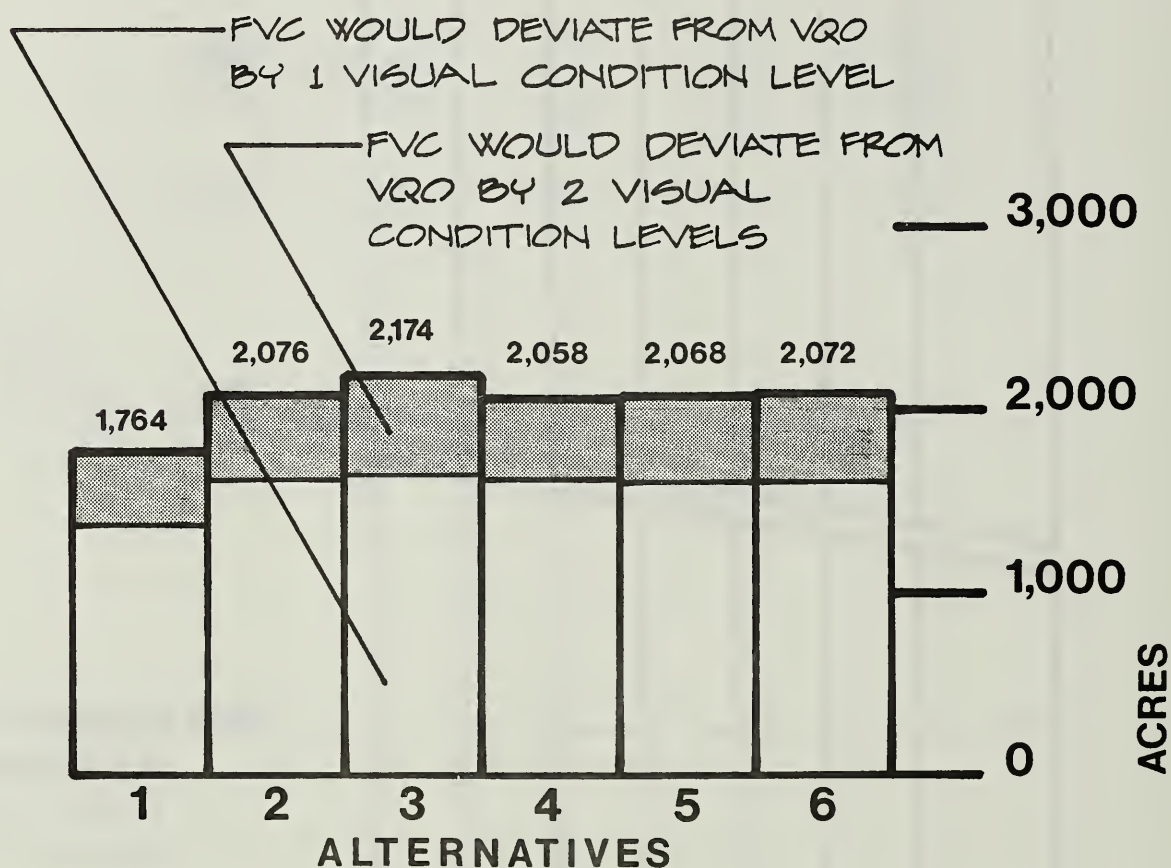
## VISUAL QUALITY INDEX

Montague Island, NFS Land

Figure 4-1

## 4 Environmental Consequences

By comparing the expected FVC's to the adopted VQO's, the number of acres not expected to meet VQO's can be calculated. Figure 4-2 displays this data subdivided by the number of visual condition levels by which the acres would not meet the VQO direction. The total number of acres not meeting VQO's under each alternative constitute the total visual resource rehabilitation need associated with that alternative.



**VQO NONCOMPLIANCE**  
Montague Island, NFS Land

Figure 4-2

## Alternative 1

No major development activities would be undertaken. Consequently no major changes in visual condition would occur. Natural rehabilitation of existing landscape modifications during the time period under analysis would not be sufficient in this or any of the alternatives to noticeably raise visual condition levels. Thus the average forest visitor would not notice any appreciable changes to the National Forest landscape of Montague Island or the rest of Management Area.

## Alternative 2

Alternative 2 would maintain visual quality on 97.1% of Montague Island and would reduce visual quality on 2.9%. The percentages listed here and in the text describing the other alternatives refer to the effects of management activities on National Forest land only. The overall visual quality of this alternative, measured by the Visual Quality Index (VQI), is the highest of the action alternatives. The VQI would decrease from its current level, 98.4%, to 97.4%. For reference, a totally pristine, untouched landscape would have a 100% VQI; if all National Forest lands on Montague Island were drastically altered, the resultant VQI would be 30.4.

Alternative 2 would concentrate management activities and therefore landscape alterations to the portion of Montague Island between MacLeod Harbor and San Juan Bay. National Forest lands on the east side of the island would retain their currently natural appearance. A general comparison to the other action alternatives reveals that visual resource impacts would be relatively heavy around MacLeod Harbor and west to the vicinity of Point Bryant and relatively light around San Juan Bay. Activities around the head of MacLeod Harbor would result in visual conditions bordering between levels III and IV, which would marginally exceed the levels of alteration defined under the Partial Retention (PR) VQO for the area. The Partial Retention middleground area stretching from the south side of MacLeod Harbor to Point Bryant would be treated with several harvest units whose cumulative visual impacts would result in an overall FVC of level IV, which would therefore not meet the PR VQO. This alternative would generate more landscape alterations than any other alternative in the MacLeod Harbor--Point Bryant area.

Unlike Alternatives 3-6, no timber would be harvested on the north side of San Juan Bay. The south side would be altered by timber management activities slightly more than in the other alternatives, though it would still fall within the same FVC IV level as the other action alternatives. Because the north side would not be affected at all, the overall visual resource consequences around the bay would be the least of the action alternatives.

Views from the arterial road corridor in the MacLeod Harbor to Point Bryant area would be more altered under this than any other alternative because of the more concentrated activities in that area. About 1 3/4 miles of regeneration harvesting would front on the road. Several units would also be visible in the middleground. The overall condition of the viewshed would be level IV around MacLeod Harbor and III around Point Bryant. In total, the road corridor would have less harvest unit frontage under this alternative than in any other alternative except Alternative 3 simply because it has less road length than under Alternatives 4 through 6.



## **4 Environmental Consequences**

### **Alternative 3**

Alternative 3 would maintain visual quality on 96.4% of Montague Island and would reduce visual quality on 3.6%. The overall visual quality of this alternative, measured by the VQI, is in the middle of the range defined by Alternatives 1 through 6. The VQI would decrease from its current level, 98.4% to 97.1%.

In a manner similar to Alternative 2, landscape modifications would increase from current levels over a relatively limited area when compared to the other action alternatives. The southeast side of Montague would be left essentially unaltered. Relatively speaking, new alterations would be both intensive and extensive around MacLeod Harbor to Point Bryant and San Juan Bay.

Activities in the Sensitivity Level 1 MacLeod Harbor viewshed would produce FVC III to IV conditions similar to Alternative 2, noticeably more than in the other action alternatives. Again, this level of alteration would produce localized deviations from the applicable Partial Retention VQO. Overall, the area would generally be FVC III.

Further west toward Point Bryant, FVC IV would be the cumulative result of several harvest units that would generally meet Partial Retention when considered individually. Overall impacts in this area would be somewhat less than in Alternative 2 because of fewer harvest units but slightly more than in alternatives 4 through 6.

Views on both sides of San Juan Bay would have new alterations ranging individually from FVC III to V. Overall, sufficient proportions of the hillsides would be modified to convert them from their current natural appearance to a visual condition IV dominated by evidence of management activities.

As in Alternative 2, a relatively short arterial road viewshed would be created under this alternative. Impacts in that corridor would be concentrated in that stretch from the head of MacLeod Harbor to the Point Bryant vicinity. Two fewer harvest units with roadside frontage than in Alternative 2 would result in the viewshed having an FVC III for the area. Middleground impacts in this area would be similar to Alternative 2 and greater than the remaining action alternatives. In total, the road corridor would have less harvest unit frontage (less than 1 1/2 miles) than in any other action alternative because of the relatively short corridor length.

### **Alternative 4**

Alternative 4 would maintain visual quality on 96.1% of Montague Island and would reduce visual quality on 3.9%. The overall visual quality that this alternative would produce on Montague Island, measured by the VQI, is in the middle of the range defined by Alternatives 1 through 6. The VQI would decrease from its current level, 98.4% to 97.1%.

Alternatives 4, 5, and 6 would all have landscape modifications over appreciably higher percentages of the south end of Montague than would Alternatives 2 and 3. Many of these modifications would be located in sensitivity level 3 areas with Modification VQO's. Thus, relative to currently inventoried sensitive viewpoints, these new alterations in the Strike Creek--Deception Creek--Nellie Martin River area would be largely unseen.

In general, Alternative 4 would create relatively light visual impacts from MacLeod Harbor to Point Bryant and moderately heavy impacts to the San Juan Bay area. Alterations noticeable from the water, beach or lodge around MacLeod Harbor would be minimal. In addition, in Alternatives 4 through 6, one rather than 2 LTF's would be developed and operated in the harbor. That one LTF would be located on private land. Thus these alternatives and Alternative 1 would have both fewer cumulative landscape modifications, fewer National Forest acres with landscape modifications and no acres not meeting VQO's because of LTF's. Thus National Forest lands in MacLeod Harbor would comply with the applicable VQO's under this alternative. Harvest units 26 and 27 at the Point Bryant end of the area would produce the landscape alterations most noticeable from the water and opposite shoreline but the composite character of the viewshed would still be predominantly natural and would therefore meet the PR VQO. Individually, unit 27 would be a dominant alteration in its immediate area and would therefore not meet the Partial Retention VQO.

Both sides of San Juan Bay would be affected. A somewhat higher proportion of the north side would have visible openings created by timber harvesting than would the south side; nonetheless both areas would be expected to be within the range of alterations defined by FVC IV. Consequently the resulting level of landscape modification would be one level below (less natural) that specified by the PR VQO.

The newly created arterial road viewshed would include a spectrum of conditions ranging from completely natural (outside of the presence of the road) to severely disturbed. Around MacLeod Harbor, the view would be predominantly natural (FVC III) with some localized disturbances that would be heavily modified FVC V (units 4 and 5). Overall the appearance would be similar to that created by Alternative 3. As the road swings around to Point Bryant, there would not be the roadside harvest units that would be associated with the previous Alternatives and the roadside landscape would retain a natural appearance (FVC II) overall. The Strike Creek--Nellie Martin River corridor would have about 3 1/4 miles of harvest unit frontage. The individual harvest units would each be FVC IV to V in appearance. Over 20% of this portion of the corridor would thus have a heavily modified appearance; this level of alteration would be sufficient to give an overall heavily modified FVC V appearance to the Strike Creek--Nellie Martin River corridor.

## **Alternative 5**

Alternative 5 would maintain visual quality on 95.6% of Montague Island and would reduce visual quality on 4.4%. The overall visual quality of Montague Island, measured by the VQI, would be in the lowest third of the range defined by Alternatives 1 through 6. The VQI would decrease from its current level, 98.4%, to 97.0%.

The scope of changes to the Montague Island landscape associated with Alternative 5 would be similar to those associated with Alternative 6 and slightly greater than those associated with Alternative 4. Large portions of the south end of the island would have more manmade modifications than they do now. In relation to the other alternatives, Alternative 5 would create comparatively light visual impacts from MacLeod Harbor to Point Bryant and moderately heavy impacts to the San Juan Bay area. Alterations noticeable from the water, beach or lodge around MacLeod Harbor would be minimal.



## 4 Environmental Consequences

As under Alternative 4, harvest units 26 and 27 near Point Bryant would produce some of the more noticeable alterations in the area. Again, unit 27 would be FVC IV and would therefore exceed the threshold of alterations permitted by Partial Retention by one level. The overall visual quality of the viewshed would still be predominantly natural and would therefore meet Partial Retention for the viewshed as a whole.

Changes in the San Juan Bay landscape would be comparable to those under Alternative 4 and slightly less than under Alternative 3. While different units would be harvested in this alternative (unit 46 would be harvested in this alternative in place of units 45 and 47 in Alternative 4) the overall affect on the appearance of the north slope would be about the same; obvious manmade disturbances created by the harvest openings would change the slope from a natural-appearing landscape to a landscape dominated by the alterations (FVC IV). The effects of south slope harvest units would be identical to those in Alternative 4: somewhat less than on the north slope but still FVC IV overall. Conditions of individual treatment units would vary from FVC II for stand 58 to FVC V for unit 46. FVC III conditions are necessary to meet the PR VQO for the San Juan Bay side slopes.

The landscape along the arterial road would be similar under this alternative to that in Alternative 4. Again, the greatest number and concentration of alterations would be in the corridor north from Strike Creek and Deception Creek. Effects from MacLeod Harbor to Point Bryant would be comparatively light; the overall visual condition of that portion of the corridor would be FVC III. Impacts would be just slightly less in this area than under Alternative 4. By treating unit 19 instead of unit 5, harvest unit frontage along the road is reduced slightly from the levels associated with Alternatives 3 and 4 and impacts are more dispersed.

Conversely, visible alteration of the road viewshed in the Strike/Deception Creek area would be somewhat greater than under Alternative 4. Approximately 3 3/4 miles of road frontage would be bordered by harvest units in that area, as compared to about 3 1/4 miles in Alternative 4. Overall levels of naturalness in the viewshed would also fall within FVC V. Thus only Alternative 6 would generate more modifications of the landscape along the mainline road, both through this area and in total.

### Alternative 6

Alternative 6 would maintain visual quality on 95.5% of Montague Island and would reduce visual quality on 4.5%. The overall visual quality of Montague Island, measured by the VQI, would be the lowest in the range defined by Alternatives 1 through 6. The VQI would decrease from its current level, 98.4%, to 96.9%.

Landscape changes around MacLeod Harbor, Point Bryant and San Juan Bay would be essentially the same as under Alternative 5. Alteration of the proposed mainline road corridor would be somewhat greater than in the previous alternative and would therefore be greater in total than in any other alternative. From Strike Creek to the Nellie Martin River, about one half mile more of harvest units would front on the road than in Alternative 5. Those units would, however, be dispersed over a greater length, with more units near the Nellie Martin River end of the road and less concentration of units around Strike Creek. Given that about 25% of the Strike Creek to Nellie Martin River



portion of the road would pass through major landscape disturbances, the overall visual condition of this section of the corridor would be FVC V as in Alternatives 4 and 5. The extent of that disturbed landscape would extend further toward Patton Bay, however, and thereby alter some of the more sensitive land in the corridor in the proximity of the Nellie Martin River.

### **Long-term Effects**

Most of the visual resource consequences described above would be relatively short term effects. The duration of the visual impacts generated from timber harvesting would last from 20 to 40 years. Steep areas where the harvest unit would be fairly close to the viewpoints would be expected to take up to the 40 year maximum to return to a natural appearance (FVC II) and meet a Retention VQO. These same types of areas would be expected to take 15 to 20 years to meet Partial Retention VQOs. Areas that are flatter and further from the viewpoint would return to a natural appearance in 20 years and would be predominantly natural within 10 years. For example, the large, steep units at the west end of San Juan Bay (harvest unit 45, 46 and 65) would not become fully natural in appearance for 30 years but would allow the landscape to appear predominantly natural within 15 years. Since the units at the east end of the bay are seen from a greater distance and a more oblique angle, they would return to FVC II in 20 years and would reach FVC III in 10 years. Thus compliance with the Partial Retention VQO would be achieved for the entire drainage within 20 years. Within 10 years, areas of noncompliance would become more localized and much less widespread. The harvest units on the south side of MacLeod Harbor would return to a more natural character on the faster timeline because of the distance of the viewpoints in or across the water and because, individually, they were less visible to start with.

While many of the roadside units in the arterial road corridor are on flat terrain, their immediate proximity to the road subjects them to greater scrutiny. Slash and stumps would remain dominant elements for 12 to 15 years. After 20 to 25 years the primary unnatural characteristic would be the absence of any mature trees. This would only become conspicuous where it continued for long distances along the road (i.e. in Alternatives 4 and 5 in the Strike Creek area).

Landscapes disturbed by fish habitat enhancement projects would also become more natural in appearance as indigenous vegetation returns and grows over disturbed areas. In some cases, structures or landforms might remain as evident alterations and not permit a full return to a natural appearance but the natural character of those affected areas would largely return within 10 to 15 years.

Facilities planned to remain in place on a long term basis--system roads, permanent LTF's, trails, parking areas and recreation structures, would remain as permanent landscape alterations. While vegetative growth would lessen the immediate effects of construction of these facilities soon after project completion, a significant change from the conditions discussed above would not occur because of the continued maintenance and the permanent nature of the structures.

While the visual effects of the management activities proposed for this planning period would evolve as explained above, future management activities can reasonably be ex-

pected to continue. Timber management activities could continue to produce the greatest quantity and magnitude of landscape alterations and loss of the natural landscape character on Montague Island. Given current plans to place all suitable timber stands under a regulated rotation schedule for harvest, those effects would become much more widespread across the island. Additional changes would be evident in areas that would be affected by activities proposed by the alternatives analyzed herein: San Juan Bay and the Strike Creek corridor contain additional stands not proposed for entry in this planning period that, if harvested, would again return those viewsheds to conditions dominated by landscape modifications created by man. In addition, stands distributed all along the west coast and around the north end of the island would cause alterations to be spread throughout those areas as they were roaded and harvested. Thus as old harvest units returned to natural appearances new ones would be harvested on an ongoing basis. Given a relatively long period between entries, some areas could go through fairly long periods where they maintained a natural or near natural appearance but, over time, the average appearance of most of the coastal slopes and valleys around the island would include evidence or even dominance of management activities. While natural features would remain prominent parts of that coastal landscape, and while the scenic high peaks and ridgelines above the forested slopes would remain natural or even pristine in appearance, the perimeter of the island would no longer retain its current natural character.

Areas with the greatest concentration of productive forest land would have the greatest probability of remaining dominated by management activities on an continual basis. The area between MacLeod Harbor and Hanning Bay and the peninsula north of Rocky Bay and Stockdale Harbor have the most continuous forest cover outside of areas proposed for entry this planning period. The MacLeod Harbor to Hanning Bay area is also the most visually sensitive area outside of those that would be entered this period. This portion of the coast is currently Sensitivity Level 1 while the remainder of the coast north to the end of the island and around to Zaikof Bay is Sensitivity Level 2 in recognition of light small boat traffic. While current use is relatively light along Montague's inside coast, the kayakers who visit this area have expressed particular interest in maintaining the natural character of the landscape seen from the water. This type of recreational boat traffic is growing in Prince William Sound and would be expected to increase along Montague Island also. Use of the bays and harbors would be expected to increase even more if an alternative is selected that provides new recreation facilities in places like Rocky and Zaikof Bays. Because of this increasing use, inventoried sensitivity levels would eventually be expected to change to Sensitivity Level 1 in some of the more popular bays and harbors. While such inventory changes could trigger changes in landscape management direction and adopted VQO's, prioritization of other resource management objectives above landscape management objectives could also trigger changes of VQO's to allow more modification of the landscape. Given this uncertainty, current VQO's will be kept as the basis of assessing the significance of the consequences. Based upon this assumption, the Sensitivity Level 1 middleground starting about two miles south of the Montague lagoon and continuing around Hanning Bay down to MacLeod Harbor would join MacLeod Harbor and San Juan Bay as the landscapes most likely to be regularly modified beyond the thresholds specified by



their Partial Retention VQO's. The foreground strip along the coast from the lagoon around to Zaikof Bay would have deviations to its Partial Retention objective on a less routine, more localized basis.

In addition to landscape changes from continued timber management and roading, additional recreational facility development would create some additional shifting towards a more man-altered landscape. If National Forest timber management continues to be limited to Montague Island, recreation facilities would be the primary influence upon the remainder of the Big Island landscape. As with short term effects, the consequences of recreation facilities over the long term would still be relatively slight. Facilities would, for the most part, be small and easy to blend into their settings to keep the landscape predominantly natural. Growing recreation demand would, over time, increase the likelihood of large facility development--marinas, lodges, campgrounds--that could be dominant landscape alterations.

Fish and wildlife habitat enhancement projects would generally continue to create small, non-intensive alterations that would still leave the natural elements of the landscape as the predominant features.

In summary, long-term expectations for the Big Islands landscapes are for the natural character of National Forest land on Hinchinbrook and Hawkins island to remain largely intact with some minor exceptions caused by additional enclaves of recreation or habitat enhancement projects. In contrast, altered landscapes would become more widespread around the lower elevations of Montague Island. The viewsheds that would be the most heavily altered in the near term, those on private lands, would, however, grow more natural in appearance over an extended period until standing timber volume again made commercial harvesting economically viable.

### **Irreversible and Irretrievable Effects**

None of the near or long-term visual resource consequences foreseen for the Big Islands would be irreversible. Given sufficient time and management direction, natural and management rehabilitative processes will return timber harvest units, roads, recreation facilities and other evidence of management activities to a natural appearance. Longer periods, even hundreds of years, may be necessary for some altered landscapes to return to their current pristine state.

The composite irretrievable effect upon the visual resource is the loss of the natural character as the result of landscape modification. That loss of visual quality during the time that the landscape is altered cannot be retrieved. The degree of that loss is proportional to the amount the landscape is altered from a natural to an unnatural appearance, as measured by the FVC's associated with each alternative. One indicator of the importance of the loss is the degree of compliance with VQO's, which has been previously discussed above. The duration of the irretrievable loss would be the time for the landscape to return to a natural appearance. If only the activities proposed for this planning period were undertaken, that period would generally be no more than thirty years for vegetative management activities. The loss caused by more permanent



facilities such as system roads and recreation cabins or trailheads would last for the life of the facility. Current plans would be to maintain those facilities for the foreseeable future; thus the duration of the irretrievable loss of visual quality would be a long term effect.

If future management activities continue as projected under the long-term effects section, the irretrievable losses of the natural character of significant portions of the Montague Island would be perpetuated.

### **Cumulative Effects**

All the action alternatives include timber harvest activities which would, in conjunction with road construction, habitat projects, and recreation facility construction, make the island less natural. Given that, within the National Forest Landscape Management System, naturalness is a key component in scenic quality, the lessening of the natural character by management activities would reduce the overall scenic quality of Montague Island under all the action alternatives.

The effects to the Montague Island landscape from resource management activities on private lands are assumed to be common to all the alternatives. The cumulative effects upon scenic quality would thus be the existing alterations, plus the private landscape alterations, plus the sum of the alterations associated with National Forest management activities. Since the first two groups of effects are basically constant to all alternatives, the main differences between the alternative's visual resource consequences arise from the differences in National Forest management activities planned under each alternative.

While the activities anticipated on private land would not vary much between alternatives (except the number and location of LTF's as discussed above), they would nonetheless generate major modifications of the landscape. The greatest changes would occur in association with timber harvesting in the Patton Bay-Beach River area and in MacLeod Harbor. About 600 acres are expected to be harvested in MacLeod Harbor; almost 5,000 acres would be harvested in the Patton Bay-Beach River complex. Well over half of the slopes above the north face of MacLeod Harbor, the northern two-thirds of Patton Bay and most of Beach River drainage are expected to be harvested and thereby converted to a non-natural appearance. Because of their vast size, the harvest units would be FVC VI, a visual condition in which severe disturbances are in contrast with the natural landscape character. The consequences of these effects would cross over land ownership boundaries and affect the overall visual character of these viewsheds. Since essentially the entire viewshed of the Beach River area would be harvested, the character of that recreation setting would be drastically altered. Thus, even without any additional alterations on National Forest land, the natural character of these viewsheds in their entirety would be reduced.

Much of the area that would be harvested is on level terrain and therefore has a high capability to absorb visual alterations (high Visual Absorption Capacity--VAC) without displaying noticeable evidence of those alterations. Thus change in the landscape setting that would be evident from the National Forest viewpoints would be somewhat less than what might otherwise be expected from that magnitude of landscape modification.

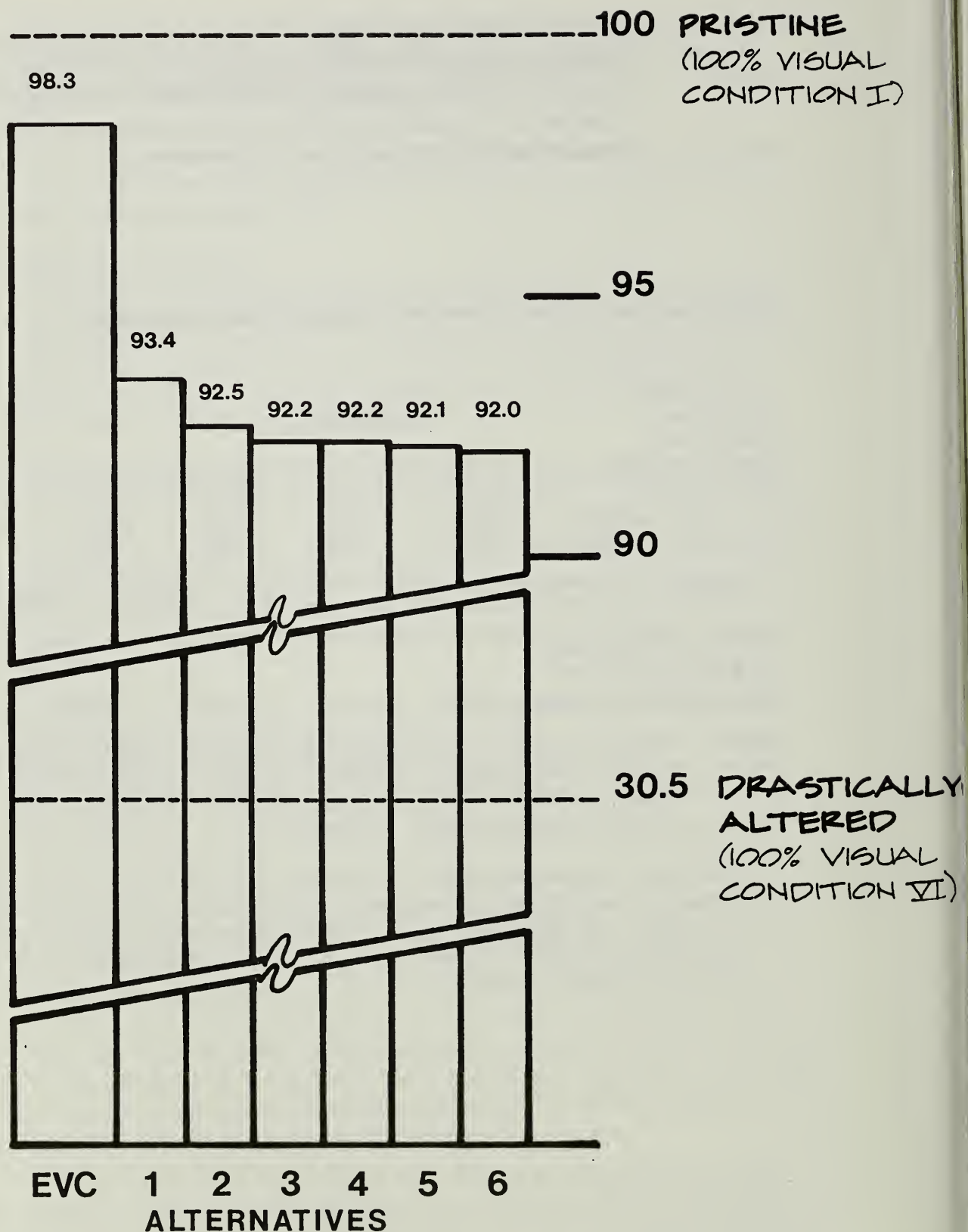
Thus, in the data displayed below, the change in the overall visual condition of these viewsheds is shown as a decline to FVC V rather than VI. The table 4-37 displays the effects upon the natural appearance of all management activities on all lands on Montague Island. The acres in the FVC I and II rows represent the areas that would retain a natural appearance after alternative implementation.

#### 4-39 Acres not in compliance with VQOs on Montague Island

| # of Visual<br>Condition<br>Levels of<br>Noncompliance |       | ALTERNATIVES |       |       |       |       |       |
|--|-------|--------------|-------|-------|-------|-------|-------|
|  |       | 1            | 2     | 3     | 4     | 5     | 6     |
| 1  | 1,365 | 1,610        | 1,634 | 1,611 | 1,601 | 1,605 |       |
| 2  | 399   | 466          | 540   | 447   | 467   | 467   |       |
| TOTAL  |       | 1,764        | 2,076 | 2,174 | 2,058 | 2,068 | 2,072 |
| TOTAL as Percentage<br>of Montague Island              |       |              |       |       |       |       |       |
| National Forest Land                                   |       | 0.9%         | 1.0%  | 1.1%  | 1.0%  | 1.0%  | 1.0%  |

NOTE: Acres listed for Alternative 1 are the areas, primarily resulting from prior timber harvest, where the inventoried EVC does not meet the adopted VQO's. Those acres are also included within the acres shown under alternatives 2 through 6.

The acres shown represent the areas that have been or would be actually modified by management activities. They do not include acreages for adjacent areas in viewsheds whose overall visual condition would no longer meet the applicable VQO's (i.e., the San Juan Bay Viewshed).



## VISUAL QUALITY INDEX

Montague Island, all lands & activities

Figure 4-3



## Cultural Resource

All projects listed for the Big Islands Management Area Analysis alternatives, with the exception of the feasibility studies and precommercial thinning, have the potential to directly or indirectly impact cultural resources. Impacts of this kind will be avoided or mitigated by conducting appropriate cultural resource surveys prior to project implementation. The standards and guidelines for cultural resources, as set forth elsewhere in this document, spell out the procedures to be followed.

## Soil and Water

### Short Term Effects

An increase in stream sedimentation above natural levels which would adversely impact the water quality can be expected upon implementation of all projects that disturb the vegetation and the surface organic layer on the mineral soils. This could be the result of either mass movements or surface soil erosion. Timber harvest and associated road construction activities can all contribute to the acceleration of mass movements, soil erosion, and stream sedimentation. There is some potential for mass movement to occur from implementation of these alternatives. Areas with potential for mass movement are likely to occur as a small inclusion within a timber harvest unit or road segment. The application of Best Management Practices (BMP's) and Standards and Guidelines can reduce the potential for mass movement.

### Long Term Effects

A long term effect from the development of road and hardened skid trails will be the removal of an area beneath the road surface from productivity. Removal of the vegetation through construction of the road may increase the productivity of the area immediately adjacent to the road because of the reduction of vegetative competition. An increase in productivity may also occur through an increase in soil drainage in wet soils, effectively lowering the water table by piling up the top soil and digging a drainage ditch during the construction of the road.

Sedimentation of San Juan and Nellie Martin Rivers could result in a reduction of spawning habitat for salmon.

Soil and/or water pollution from surface spills or indirectly from subsoil contamination from the spilling of gasoline, oil, and other chemicals could occur from any of the proposed activities. These hazards would be expected to be small in size and localized near buildings, maintenance areas, and fueling sites.

### Irreversible and Irretrievable Effects

Natural soil erosion and mass movements would continue to produce sedimentation into streams from exposed mineral soils regardless of the alternative implemented. The degree and specific locations of the impacts to the soil and water resources depends on the development proposed in each of the alternatives. The application of Best Management Practices (BMP's) and standards and guidelines can minimize soil disturbance and subsequent erosion from non-point pollution. Since soil and water was not a specific public issue, the environmental effects were not discussed separately for each of the alternatives.

## 4 Environmental Consequences

The loss of soil productivity from land removed from vegetative production would be the major irreversible and irretrievable effect. This can result from the acceleration of natural processes such as mass movements and soil erosion caused by proposed activities, or from the land area removed from production because of replacement by roads and other development (Table 4-40). Potential for mass movement and soil erosion may be accelerated from blowdown along cutting boundaries, road construction, and rock pits. This potential may also be increased by the removal of trees causing an increase in soil-water content.

The loss of soil from the surfaces of roads, trails, landings, airstrips, etc. would be an irreversible and irretrievable effect. The removal of the surface organic layer from alluvial soils would eliminate the soil productivity.

### **Cumulative Effects**

Significant increase over the natural sediment load are not expected from National Forest Management activities. Cumulative effects may occur where the Patton River flows into the Nellie Martin River just before it flows into the ocean. The effects to these rivers would be from timber harvest on private lands and activities that would be implemented by the Forest Service.

**4-40 Acreage of soil productivity that will be removed due to development of roads, trails, cabins and tent platforms**

| Alternatives        | 1 | 2   | 3   | 4   | 5   | 6   |
|---------------------|---|-----|-----|-----|-----|-----|
| Permanent Roads     | 0 | 234 | 279 | 349 | 329 | 338 |
| Temporary Roads     | 0 | 184 | 221 | 308 | 281 | 286 |
| Motorized Trails    | 0 | 0   | 0   | 0   | 21  | 0   |
| Nonmotorized Trails |   | 0.3 | 7.0 | 17  | 32  | 24  |
| Cabins              | 0 | 0.3 | 0.3 | 0.3 | 2.1 | 0.3 |
| Tent Platforms      | 0 | 0   | 0.3 | 0.9 | 0.9 | 0.9 |

(1) Estimated width of road corridor estimated removed from productivity was 50 feet.

(2) Estimated width of motorized trail removed from productivity was 25 feet.

(3) Estimated width of nonmotorized trail removed from productivity was 10 feet.

(4) Estimated area around cabins and tent platforms removed from productivity was 0.3 acres.



## Subsistence

The proposed actions and alternatives can be broken down into two broad categories: A. actions that are ground-disturbing in nature; and B. general management direction for a piece of land and the standards and guidelines that would apply to on-the-ground activities.

The activities that could potentially impact subsistence use the most are timber management, roads and trails, and cabins.

In evaluating the effects of implementing the amended Forest Plan on subsistence use of resources, each alternative was evaluated against the following criteria:

The potential to reduce important subsistence fish and wildlife populations by a) reductions in numbers; b) redistribution of subsistence resources; or c) habitat losses.

The potential to restrict access.

The potential to increase competition.

### The Potential to Reduce Populations:

Timber management has the greatest potential to reduce fish and wildlife population through habitat change. Deer winter range would be lost if harvesting took place in mature forest important for winter habitat. Fisheries habitat could be lost if improper harvesting impacted fish streams. Standards and guidelines developed for this management area reduce the potential to lose both fish and wildlife habitat. Proposed projects in some alternatives would result in increased fish populations.

All of the timber management activities, for all alternatives, is concentrated within the south half of Montague Island. While implementing any of the alternatives identified in Chapter 2, except for the no action alternative, could reduce deer populations through habitat loss, this is not expected to have a significant impact on the subsistence resources used by residents of Prince William Sound. Any habitat loss would occur in areas not receiving significant use by subsistence users.

The available evidence shows that the overwhelming majority of subsistence deer hunting that takes place in the Big Islands Management Area occurs on Hawkins, Hinchinbrook and the north half of Montague Island. Hunting on the south half of the island, where the deer could be potentially impacted, is primarily by non-subsistence hunters.

The placement of a cabin within subsistence use areas would have a minimal impact on wildlife populations. The amount of ground disturbed is so small that a change in population level would not be discernible.

### The Potential to Increase Competition

All of the roads, trails and airstrips proposed in the alternatives would be developed on the south half of Montague Island. Increased access to this area would not increase competition for subsistence resources historically used by Prince William Sound residents.

The proposed cabin in Shelter Bay could increase competition for deer slightly. Approximately 100-150 user days during the deer hunting season could come from non-unit 6 residents. This use would occur in an area moderately important to Cordova residents for deer hunting.

Alternative 5 proposes a cabin in Zaikof Bay and Rocky Bay. This area is the second most important deer hunting area to Cordova residents and the most productive deer hunting area. This area is currently receiving use by non-unit 6 residents who compete with subsistence users. Hunters currently using this area would probably continue to use it after the cabins are in place. The cabins could increase non-resident use by 100-200 user days during the hunting season.

These cabins would be available to subsistence users as well as non-subsistence users.

The timber management activities that would take place on National Forest lands on Montague would not increase competition in other areas. The reduction in habitat would not be significant for the life of this plan and deer populations would not drop significantly. Changes in hunter distribution would not impact high subsistence use areas. The timber management activities that would occur on private lands around Patton Bay and Beach River, combined with proposed and future timber management activities on National Forest lands, may significantly reduce deer habitat and populations on the south end of Montague. As much as 53 percent of the moderate winter habitat capability would be lost over the next 100 years. Most of the change in deer habitat in this area would be the result of private development.

Some deer hunters may shift their activities to the north and compete with unit 6 hunters because of the decreased deer population, however this change is not expected to be large. The increased access provided by the action alternatives and high cost of accessing subsistence use areas may keep most non-subsistence hunters from competing with subsistence users.

### **The Potential to Restrict Access**

Under all alternatives, including the proposed action, access by subsistence users would not be impacted. The management prescriptions and standards and guidelines do not restrict access. The developments proposed for the south end of Montague Island would improve access to this area.

The activities proposed in this Management Area Analysis, if conducted in other parts of the Management Area or other parts of Prince William Sound, could impact subsistence resources to a greater extent than the areas selected here. Some of the available land would be closer to the communities in Prince William Sound classified as subsistence communities and this would increase the potential for significant impacts to subsistence uses.

For subsistence purposes, other lands are available outside the Big Islands Management Area. Some of these areas are currently being used by subsistence users. Other lands available for subsistence uses are private land or too far from the communities to be readily accessed for subsistence uses.



## **4 Environmental Consequences**

The environmental impact statement looked at several alternative ways of implementing the Forest Plan as amended. The no action alternative would have the least impact on subsistence resources or their use. Other alternatives focused the ground disturbing activities such as timber management in the southern part of Montague Island. None of the alternatives focused significant activities in areas currently used by subsistence users.

### **FINDING**

The proposed action, and other alternatives considered, focus management activities in areas currently receiving very low levels of subsistence use. The management prescriptions and standards and guidelines being applied to the Management Area would mitigate potential impacts on subsistence use. Future potential timber management, and proposed timber management on adjacent private lands, may cause a drop in deer populations in the future. This drop would occur in areas not currently receiving high subsistence use but may cause some non-subsistence hunters to shift their hunting area and compete with subsistence users. Because many of the areas currently used by subsistence users require boat access and are not readily available to non-residents, and the cost of access is fairly high, the increase in competition would be slight.

Based on the above process, and considering all the relevant information, this analysis finds that the impacts of the proposed action, combined with reasonably foreseeable future activities, and activities planned on adjacent lands, would not significantly impact subsistence use of wild resources in Prince William Sound.

## **Economic and Social**

The timber section of this chapter contains an economic analysis based on timber appraisal analysis. This section displays costs and benefits of all proposed projects and compares the relative overall economic efficiency of each alternative.

The level and mix of goods and services made available to the public varies by alternative. These differences constitute the economic and social consequences discussed in this section. They include estimated government expenditures and revenues and impacts on local communities.

There are a number of aspects of social and economic consequences discussed in this section. The economic consequences of the alternatives are discussed in terms of present net value (PNV), discounted benefits and discounted costs. PNV includes values assigned to potential changes in recreation use and timber production over a ten-year period. The direct, indirect, and induced impacts of the project alternatives are discussed in terms of employment, income, and cumulative value to local communities.

The assumptions and procedures used to analyze economic consequences are outlined in the planning record. They are consistent with the process used for evaluating the economic consequences of the Forest Plan as amended. Data for prices and costs, however, were developed specifically for the Big Islands Management Area Analysis process.



There are three assumptions used in this analysis:

1. Predicted outputs are accurate; e.g., timber harvest will equal projected harvest levels.
2. The prices and costs assigned to resource outputs are accurate estimates of current and future resource values.
3. The Chugach National Forest budget will be adequate to support activities proposed in each alternative.

The estimates used in the analysis were based on costs actually experienced by the Forest as documented in the planning record. In the effort to improve efficiencies, all opportunities to reduce both timber sale purchaser and government costs were explored.

While sale preparation, administration, and reforestation planning activities are not traditionally funded with money generated from timber sales, they are appropriately included in the estimates of total cost in each alternative. These funds are appropriated by Congress and are an expense in the implementation of an alternative. These funds are important elements in evaluating the economic tradeoffs between alternatives.

### **Important Interactions**

In general, the short-term monetary value of the alternatives depends on the amount and method of timber harvest and road construction and the amount of land planted to rehabilitate harvest areas. The high cost of roads and logging may be offset by a resurgent lumber export market. The monetary value of the alternatives is also dependent on meeting expected recreation use levels once investments are in place.

### **Net Cash Value**

Net revenue is the difference between the revenues generated by an alternative and the costs required to implement it. In this analysis, revenues are from timber harvests and recreation "willingness to pay" values for recreation visitor days (RVDs) and wildlife/fish user days (WFUDs).

Timber management costs include: 1) timber sale preparation and administration; 2) road construction; 3) mitigation of the effects of timber harvests; and 4) reforestation.

Costs of building segments of roads depend on design standards and the difficulty of the terrain. The cost of road segments ranges from \$131,372 to \$141,345 per mile. The cost of reforestation depends to the amount of land planted and how far it is from roads. The range is between \$400 to \$600 per acre. Mitigation costs depend on the location and amount of measures required.

Recreation and fisheries management costs include: 1) operations and maintenance; 2) recreation facilities/trail construction and 3) fisheries projects.

Recreation and fisheries costs vary widely by alternative, based on the proposed level of investment in facilities/projects. Investment levels in turn affect the operation and maintenance costs of the alternative. Investments range from \$2,000 for an interpretive site to \$150,000 for a fisheries enhancement project.

### Present Net Value

The future value of resources on the Forest will be influenced by the decision made in this EIS. This is because managed timber stands would produce future cash flows, and investment in certain facilities (roads or airstrips) would provide access and reduce future recreation/timber management costs. The monetary value of the project area, as indicated by Present net Value (PNV), includes both the immediate benefits and costs of the timber and recreation outputs over the next ten years. PNV primarily reflects changes in net timber values and recreational "willingness to pay" values.

PNV differs from the net cash value in that: 1) it includes values and costs expected from timber management and recreation for the next 10 years; and 2) it takes into account interest over time by discounting all benefits and costs over the next 10 years with a 4 percent discount rate.

The total value assigned to future timber management varies between alternatives (Table 4-41) according to the amount of road/facilities that are proposed, the volume of timber harvested and the number of RVDs/WFUDs utilized. In some alternatives which include roads, the cost of the road system is partially offset by the value of the timber and cost sharing. The cost of the arterial road would be shared between the private landowner and the Forest Service with shares estimated at 63% and 37% respectively.

### Communities

Timber harvest, recreation, wildlife and fish habitat, and other Forest management activities affect local employment levels. However, effects attributable to any project alternative are relevant only in a comparative sense. These measures show how each alternative may differ from the next in the generation of jobs, income and value to communities (Table 4-42). They are not indicators of any "improvement" in the local economy or quality of life, since these qualities are dependent on many non-quantifiable measures.

#### 4-41 Present net value and discounted costs and benefits of alternatives

(Thousands of Dollars)

| Alt. | PNV  | Change | Discounted |        | Discounted |        |
|------|------|--------|------------|--------|------------|--------|
|      |      |        | Costs      | Change | Benefits   | Change |
| 1    | 1418 | -1123  | 1056       | 7961   | 2474       | 6838   |
| 6    | 295  | - 105  | 9017       | 1919   | 9312       | 1814   |
| 5    | 190  | - 193  | 10936      | -2667  | 11126      | -2860  |
| 4    | - 3  | - 235  | 8269       | - 209  | 8266       | - 444  |
| 3    | -238 | - 87   | 8060       | -1201  | 7822       | -1288  |
| 2    | -325 |        | 6859       |        | 6534       |        |



## 4-42 Changes in employment, personal income and value to local communities

| Alternative   | 1 | 2     | 3     | 4     | 5     | 6     |
|---|---|-------|-------|-------|-------|-------|
| <hr/>   |   |       |       |       |       |       |
| Employment (Jobs)                                   |   |       |       |       |       |       |
| Timber  | 0 | 115   | 165   | 148   | 186   | 186   |
| Recreation  | 0 | 6     | 11    | 19    | 86    | 18    |
| TOTAL   | 0 | 121   | 176   | 167   | 272   | 204   |
|   |   |       |       |       |       |       |
| Personal Income (000's \$)                          |   |       |       |       |       |       |
| Timber  | 0 | 3755  | 5400  | 4836  | 6083  | 6083  |
| Recreation  | 0 | 115   | 217   | 372   | 1700  | 363   |
| TOTAL   | 0 | 3870  | 5627  | 5208  | 7783  | 6446  |
|   |   |       |       |       |       |       |
| Cumulative Value to<br>Local Communities (000's \$) |   |       |       |       |       |       |
| Timber  | 0 | 16508 | 23715 | 21227 | 26614 | 26614 |
| Recreation  | 0 | 298   | 562   | 965   | 4410  | 941   |
| TOTAL   | 0 | 16806 | 24277 | 22192 | 31024 | 27555 |

NOTES: These changes are the cumulative effects of the National Forest timber harvest volumes by alternative. The life of the sale is assumed to be five years, and all impacts are measured from a 1993 sale year. Employment impacts include direct effects (in the lumber and wood products industry) and indirect and induced effects (in all other industries). Personal income and Cumulative Value to Local Communities are expressed in 1985 dollars.

For example, jobs dependent on timber harvesting could increase if harvest is in addition to the normal level of timber harvest in the market area. But employment levels would be unchanged if the harvest is offset by harvest reductions elsewhere. Furthermore, adjustments within existing mill capacity could absorb increased timber harvest with little or no change in employment levels.

### **Alternative 1**

Alternative 1 would produce only recreation benefits and incur only recreation costs, as no road or timber investments are planned. Discounted recreation benefits would amount to \$2,474 thousand from the 24,400 RVDs/WFUDs currently demanded. Increases in RVDs/WFUDs in other alternatives are compared to this baseline. The PNV would be \$1,418 thousand which is attributed to managing the project area for the next ten years. This assumes that recreation use will increase over time with the small initial investment in wildlife/fisheries projects.

The cost of implementing this alternative is \$139 thousand in FY1990 to \$129 thousand in FY1999. No projected effect on employment, income or value to communities is anticipated under this alternative.

The continuation of a natural condition of the public lands in the project area would provide a high level of non-market values associated with dispersed recreation. Timber harvest on the private lands in the project area will impact dispersed recreation use and roadless attributes.

The allowable timber harvest specified in the amended Forest Plan would be shifted to other project areas of the Forest. This condition would affect the next ten years of the timber harvest schedule.

### **Alternative 2**

Alternative 2 could be expected to generate a total of \$6,534 thousand in discounted benefits. Of this, discounted benefits of \$2,492 thousand from the harvest of 20 mmbf of timber would be realized. Recreation in the project area would result in \$4,042 thousand of discounted benefits from utilization of baseline RVDs/WFUDs plus 1,934 in additional RVDs/WFUDs. The PNV would be -\$325 thousand, which is attributed to managing the project area for the next ten years. This assumes that all timber volume will be sold and harvested at the estimated stumpage rate, and that recreation use will increase over time based on the initial investment in recreation and wildlife/fisheries projects.

The cost of implementing this alternative is \$1,004 thousand in FY1990 to \$129 thousand in FY1999. The total projected effect on employment is 121 jobs. Related to this is a change of \$3,870 thousand in income and \$16,806 thousand in cumulative value to local communities.

In terms of the dispersed recreation resource, road development and timber harvest activities would increase the opportunities for roaded recreation; i.e. hunting, camping, and access for fishing. Human activities would alter recreation opportunities, habitat, and visual quality. Timber harvest on

public and private lands in the project area will impact dispersed recreation use and roadless attributes. The current level of non-market values associated with the current natural condition would be foregone.

### Alternative 3

Alternative 3 could be expected to generate a total of \$7,822 thousand in discounted benefits. Of this, discounted benefits of \$3,662 thousand from the harvest of 31 mmbf of timber would be realized. Recreation in the project area would result in \$4,160 thousand of discounted benefits from utilization of baseline RVDs/WFUDs plus 3,646 in additional RVDs/WFUDs. The PNV would be -\$238 thousand, which is attributed to managing the project area for the next ten years. This assumes that all timber volume will be sold and harvested at the estimated stumpage rate, and that recreation use will increase over time based on the initial investment in recreation and wildlife/fisheries projects.

The cost of implementing this alternative is \$1,472 thousand in FY1990 to \$129 thousand in FY1999. The total projected effect on employment is 176 jobs. Related to this is a change of \$5,627 thousand in income and \$24,277 thousand in cumulative value to local communities.

In terms of the dispersed recreation resource, road development and timber harvest activities would increase the opportunities for roaded recreation; i.e. hunting, camping, and access for fishing. Human activities would alter recreation opportunities, habitat, and visual quality. Timber harvest on

public and private lands in the project area will impact dispersed recreation use and roadless attributes. The current level of non-market values associated with the current natural condition would be foregone.

### Alternative 4

Alternative 4 could be expected to generate a total of \$8,266 thousand in discounted benefits. Of this, discounted benefits of \$3,489 thousand from the harvest of 27 mmbf of timber would be realized. Recreation in the project area would result in \$4,777 thousand of discounted benefit from utilization of baseline RVDs/WFUDs plus 6,266 in additional RVDs/WFUDs. The PNV would be -\$3 thousand, which is attributed to managing the project area for the next ten years. This assumes that all timber volume will be sold and harvested at the estimated stumpage rate, and that recreation use will increase over time based on the initial investment in recreation and wildlife/fisheries projects.

The cost of implementing this alternative is \$1,584 thousand in FY1990 to \$129 thousand in FY1999. The total projected effect on employment is 167 jobs. Related to this is a change of \$5,208 thousand in income and \$22,192 thousand in cumulative value to local communities.

In terms of the dispersed recreation resource, road development and timber harvest activities would increase the opportunities for roaded recreation; i.e. hunting, camping, and access for fishing. Human activities would alter recreation opportunities, habitat, and visual quality. Timber harvest on



public and private lands in the project area will impact dispersed recreation use and roadless attributes. The current level of non-market values associated with the current natural condition would be foregone.

### **Alternative 5**

Alternative 5 could be expected to generate a total of \$11,126 thousand in discounted benefits. Of this, discounted benefits of \$4,689 thousand from the harvest of 36 mmbf of timber would be realized. Recreation in the project area would result in \$6,437 thousand of discounted benefit from utilization of baseline RVDs/WFUDs plus 28,630 in additional RVDs/WFUDs. The PNV would be \$190 thousand, which is attributed to managing the project area for the next ten years. This assumes that all timber volume will be sold and harvested at the estimated stumpage rate, and that recreation use will increase over time based on the initial investment in recreation and wildlife/fisheries projects.

The cost of implementing this alternative is \$1,785 thousand in FY1990 to \$129 thousand in FY1999. The total projected effect on employment is 272 jobs. Related to this is a change of \$7,783 thousand in income and \$31,024 thousand in cumulative value to local communities.

In terms of the dispersed recreation resource, road development and timber harvest activities would increase the opportunities for roaded recreation; i.e. hunting, camping, and access for fishing. Human activities would alter recreation opportunities, habitat, and visual quality. Timber harvest on

public and private lands in the project area will impact dispersed recreation use and roadless attributes. The current level of non-market values associated with the current natural condition would be foregone.

### **Alternative 6**

Alternative 6 could be expected to generate a total of \$9,312 thousand in discounted benefits. Of this, discounted benefits of \$4,455 thousand from the harvest of 36 mmbf of timber would be realized. Recreation in the project area would result in \$4,857 thousand of discounted benefit from utilization of baseline RVDs/WFUDs plus 6,108 in additional RVDs/WFUDs. The PNV would be \$295 thousand, which is attributed to managing the project area for the next ten years. This assumes that all timber volume will be sold and harvested at the estimated stumpage rate, and that recreation use will increase over time based on the initial investment in recreation and wildlife/fisheries projects.

The cost of implementing this alternative is \$1,849 thousand in FY1990 to \$129 thousand in FY1999. The total projected effect on employment is 204 jobs. Related to this is a change of \$6,446 thousand in income and \$27,555 thousand in cumulative value to local communities.

In terms of the dispersed recreation resource, road development and timber harvest activities would increase the opportunities for roaded recreation; i.e. hunting, camping, and access for fishing. Human activities would alter recreation opportunities, habitat, and visual quality. Timber harvest on

public and private lands in the project area will impact dispersed recreation use and roadless attributes. The current level of non-market values associated with the current natural condition would be foregone.

### **ROADLESS CHARACTER**

The amended Forest Plan recommends wilderness designation of 1,703,000 acres on the Chugach National Forest. The Plan also provides for management of Hinchinbrook Island that is consistent with Primitive ROS class conditions which will maintain the roadless character for this planning period. The Big Islands Management Area is currently unroaded.

Alternative 1 would not alter the roadless character of National Forest lands in the management area.

Alternatives 2 - 6 propose access developments for timber, recreation and fisheries projects that would alter the roadless character of the south end of Montague Island in varying degrees. The remainder of Montague Island, as well as the rest of the management area, would remain roadless until the Forest Plan is revised.

Alternatives 2 and 3 include road access on the southwest portion of Montague Island. This would result in a long-term effect of approximately 23,600 acres of National Forest being changed to a roaded condition.

Alternatives 4, 5, and 6 include road access for more of the south end of Montague Island. This would result in a long-term effect of approximately 54,500 acres of National Forest lands being changed to a roaded condition.

### **CUMULATIVE EFFECTS**

In addition to the National Forest lands, approximately 1,500 acres of private land in the MacLeod Harbor area would be changed from roadless to roaded in Alternatives 2 and 3. Approximately 12,900 acres of private land in the Patton Bay/Beach River area, which are currently roadless, would be roaded. Alternatives 4, 5 and 6 would result in a total of approximately 68,900 acres being changed to a roaded character. Given current management direction, the loss of roadless character could continue to other parts of the management area.

### **IRREVERSIBLE AND IRRETRIEVABLE EFFECTS**

Construction of roads would not be an irreversible action. Roads could be rehabilitated and, over time, the area could regain its roadless character. While the roads remain in place there would be a loss of roadless character which would be an irretrievable effect.

# **Chapter 5**

## **List of Preparers**





# List of Preparers

## **Dalton Du Lac**

BA, Dartmouth College, 1950;

MS Syracuse, 1960

Forest Service: 28 years

Forester, Snoqualmie NF, Skykomish RD, 4 years

Resource Asst, Snoqualmie NF, White River RD, 3.5 years

Timber Inventory Project Leader, Gifford Pinchot NF, 2 years

District Ranger, Mt. Baker NF, Monte Cristo RD, 4 years

District Ranger, Willamette NF, Detroit RD, 3.5 years

Group Leader - Dispersed Recreation & Wilderness, R-6, RO, 3 years

Group Leader - Dispersed Recreation, National Scenic Trail System, Wild and Scenic River System, WO Recreation Staff, 2 years

Forest Supervisor, Chugach NF, 6 years

## **Cecil R. Kuhn**

BS Geology, Boise State University - 1975

Natural Resource Management Graduate School, Colorado State University

Forest Service: 13 years

Field Geologist, Willamette National Forest, 2 yrs

Engineering Geologist, So. Engineering Zone, Willamette, 6 years.

Zone Geotechnical Leader, Zone II Engineers, Gifford Pinchot NF, 4 yrs

Colorado State University, Graduate Student, 1 yr

Planning Team Leader, Chugach National Forest 6 months

## **Fredrick L. Patten**

BS Forestry University of Montana, 1970

Forest Service: 18 years

Forester/Range Conservationist Helena & Rio Grande National Forests, 6 years

Planning Team Leader, Colville National Forest, 4 years

Forester Colville National Forest 3 years

Planning and Programing Staff, Chugach & Tongass National Forests, 5 years

## **Erin M. Bronk**

BS University of Montana, 1979 Forest Science

MFR University of Georgia, 1981 Quantitative Natural Resource Management

Forest Service: 9+ years

Operations Research Analyst, Chugach National Forest, 2+ years

Operations Research Analyst, Chattahoochee-Oconee, 1 year

Computer Specialist, Chattahoochee-Oconee NFs, 4 years

Forester, Chattahoochee-Oconee NFs, 2 years  
Research Assistant for the Institute of Ecology and the School of Forest Resources,  
University of Georgia, 4 years

**Robert W. Wilhelm**

BS Augustana College, 1969 Business Administration

MF Utah State University, 1976 Forestry

Forest Service: 13 years

Forester, Chugach National Forest, 6 months  
Interdisciplinary Planner, Chugach National Forest, 3 years  
Forester, Chugach National Forest, 5 years  
Forester, Tongass National NF - Stikine Area, 2 years  
Forester, Deerlodge National Forest, 2 years

**Zane J. Cornett**

BS Northern Arizona University, 1975 Natural Resource Management

MSF Northern Arizona University, 1978 Forestry

PhD University of Arizona, 1982 Watershed Management

Forest Service: 10 months

Computer Programmer Analyst, Chugach National Forest, 10 months  
Adjunct Faculty (Forestry), University of Alaska, 6 months  
Acting General Manager, native owned timber corporation, 8 months  
Forester, Matanuska-Susitna Borough, 3 1/2 years

**Bruce E. Williams**

AA Suffolk County Community College, 1972

BS State University of New York at Stony Brook, 1974

Forest Service: 14 years

Detail in Planning/GIS, Chugach National Forest, 10 months  
Hydrologic Technician, Chugach National Forest, 1 year  
Hydrologic Technician, Superior National Forest, 1 year  
Physical Science Technician, Region 9, 5 year  
Budget Assistant, Superior National Forest, 2 1/2 years  
Forestry Technician (Region 9 Fire Cache Mgr), Superior NF, 3 years  
Supply Technician (Region 9 Fire Cache Mgr), Superior NF, 1 year  
Biological Technician, U.S. Environmental Protection Agency, 1 1/2 years

**Lisa Fisher**

Forest Service: 1 year 9 months

Mail clerk/phone receptionist CNF 1 1/2 months  
Cabin clerk CNF 5 months  
Information Receptionist CNF 1 yr 2 1/2 months

**Molly Birnbaum**

Wildlife Science, Hocking Technical College, Nelsonville, Ohio, 1976 Associate degree

Forest Service: 9 years



Forestry Technician, Chugach National Forest, 6 1/2 years  
Forestry Technician, Tongass NF 1 1/2 years  
Forestry Technician, Big Horn NF 1 year  
Alaska Department of Fish and Game, FRED Division, 2 years

**Mark K. Franklin**

BS University of New Mexico, 1978 Biology

Information Specialist Interpretive Planner, Chugach NF, 1 year

Park Ranger, National Park Service, 3 years

**David P. Wanderaas**

BS University of Montana, 1973 (Resource Conservation)

Forest Service: 12 years

Forester, Lewis and Clark National Forest, 8 months

Forester, Chugach National Forest, 12 years

**Diane Christenson**

Forestry Technician, PNW/Chugach National Forest, 2 years

**Linda E. Kelly**

BS Washington State University, 1976 Forest Management

Forest Service: 11 years

Program Analyst, Chugach National Forest

Detail in Planning/GIS, Chugach National Forest, 10 months

Forester, Chugach National Forest, 9 years

Forester, Deschutes National Forest, 4 years

**Dixie L. Dies**

BS Business Sociology, Minor Business Administration, Weber State  
College, Ogden, UT, 1983.

Support Services Supervisor, Beaverhead National Forest

Management Analyst, Regional Office, Region 4

**Michael Pease**

BS Forestry Washington State University, 1967

MS Fisheries Science University of Washington, 1971

Forest Service: 19 years

Forest Fisheries Biologist, Chugach National Forest, 5 years

Forest Fisheries Biologist, Tongass National Forest, 9 years

Fisheries Research Biologist, Fisheries Research Institute,

University of Washington, 5 years

**J. David Blanchet**

BS Geology Williams College, 1972

Graduate Program Watershed Management Colorado State University, 1974-5

Forest Service: 14 years

Hydrologist, Chugach National Forests, 11 years

Hydrologist, Angeles National Forest, 1 year  
Recreation Technician, Arapaho National Forest, 5 seasons  
U.S. Geological Survey 1 year, Hydrologic Technician, Riverton Wyoming,  
1 year

**Samuel D. Grimes**

BS in Forestry, University of Montana, March 1976

Studying for BS in Civil Engineering, University of Alaska, incomplete

Forest Service: 13 years

Transportation Planner, Chugach NF, 3 years  
Assistant Transportation Planner, Tongass NF-Ketchikan Area, 2 1/2 years  
Civil Engineering Technician, Tongass NF-Ketchikan Area, 6 years

**Warren L. Oja**

BS Forest Management, University of Minnesota, 1977

Forest Service: 7 years

Forester Watersmeet RD, Ottawa National Forest, Michigan 1 year  
Sale Preparation Forester Iron River RD, Ottawa National Forest, 1 year  
Regional Forest Inventory Specialist, Alaska Region, 4 years  
Timber Resource Planner Supervisors Office, Chugach National Forest, 1 year

**Dean F. Davidson**

BA Chemistry and Math, Carthage College

MS Surficial Geology and Geochemistry, Utah State University

MS Soil Science and Hydrology, Utah State University

Forest Service: 14 years

Zone Soil Scientist Trainee, Caribou NF, 3 years  
Forest Minerals and Watershed Staff, 1 year  
Petroleum Geologist, Texaco, Inc. 2 years

**Kim R. Barber**

BS in Zoology, Weber State College, Ogden, Utah, 1971

MS in Wildlife Science, Utah State University, Logan, Utah, 1983

Forest Service: 5 years

Wildlife Biologist, Region 4, Regional Office, 2 1/2 yrs  
Wildlife Biologist/Range Conservationist, Humboldt NF, 1 1/2 yrs  
Wildlife/Fisheries Biologist, Chugach NF, 1 yr

**Karen A. Klinge**

BS in Wildlife Biology, Colorado State University, 1984

Forest Service: 5 years

Biological Technician-wildlife, Chugach National Forest. 5 years  
intermittent

**Robert M. Muth**

B.A.(History) University of Washington, 1973

M.P.A. (Natural Resources) University of Washington, 1975

Ph.D. (Natural Resource Sociology), University of Washington, 1985

Forest Service 19 years

Research Technician, Wildland Recreation Research Project, PNW Forest and Experiment Station, 7 years

Program Leader, Social Impact Assessment Program, National Roadless Area Review and Evaluation (RARE II), Washington, D.C., 2 years

Regional Social Scientist, Alaska Region, 10 years

**Kathy M. Kurtz**

BS Forest Biology, Colorado State University, 1980.

Forest Service: 9 years

Forestry Technician-Timber, Arapaho-Roosevelt NF R-2, 1 year

Forester-Recreation, Arapaho-Roosevelt NF, R-2, 2 years

Forester-Recreation Planner, Chugach NF R-10, 1 year

**Robert P. Metzger**

BS Biology, 1977, The Pennsylvania State University

MS Fisheries, 1980, University of Washington

Forest Service: 8 years

District Fisheries Biologist, Tongass National Forest, North Prince of Wales Ranger District, 2 years

District Fisheries Biologist, Tongass National Forest, Thorne Bay Ranger District, 2 years.

District Fisheries Biologist, Cordova Ranger District, 4 years

**Michael E. Novy**

BS Forestry, University of Illinois 1969

MS Wildlife Management, University of Michigan 1973

Forest Service: 16 years

Resource Forester: Tujunga RD, Angeles National Forest, 2 years

Sale Administration Forester: Tongass National Forest 2 years

Wildlife Biologist: Ketchikan Area Tongass National Forest, 3 years

District Ranger: NPOW Ranger District Tongass National Forest, 2 years

District Ranger: Thorne Bay District, Tongass National Forest, 3 years

Fish/Wildlife/Timber/Fire Program Manager: Chugach National Forest, 4 years

**John R. Knorr**

BS Forestry, University of Montana

MS Recreation Resources Management/Forestry Univ. of Wisconsin

Forest Service: 18 years

District Ranger, Glacier Ranger District, Chugach National Forest, 4 years

Natural Resources Interpretive Specialist, Chugach National Forest, 2 years



Supervisory Forest, Idaho Panhandle National Forest, 6 years  
Public Information & Youth Conservation Corps Specialist,  
Tongass National Forest, 1 year  
Visitor Information Specialist, Tongass National Forest, 3 years

**Steve A. Okamoto**

BS Civil Engineering, Arizona State University, 1975

Forest Service: 6 years

Forest Engineer, Chugach National Forest, 2 years  
Supervisory Civil Engineer, Tongass National Forest, Stikine Area, 4 years

**Frederick W. Prange**

BS Geology and Geophysics University of Missouri at Rolla 1977

Graduate Studies Colorado State University 1988

Forest Service: 11 years experience

Geologist, Corps of Engineers 1978-1981  
Forest Geologist, Ketchikan Area, Tongass National Forest 1981-1987  
Management Training 1987-1988  
Minerals, Soil, and Water Staff Officer Chugach National Forest 1988-1989

**Duane H. Harp**

BS Forestry Humboldt State College, 1971

MS Wildland Resource Management University of California, Berkeley

Forest Service: 13 years

District Ranger, Chugach National Forest, 2 years  
Forester, Grand Mesa, Uncompahgre and Gunnison National Forests, 6 years  
Forester, Plumas National Forest, 2 years  
Forester, Tahoe National Forest, 3 years

**James S. Tallerico**

B.S. Landscape Architecture and Environmental Planning, Utah State  
University, 1974

Forest Service: 14 years

Acting District Ranger, Cordova District, Chugach National Forest, 3 months  
Recreation Specialist, Chugach National Forest, 7 years  
Forest Landscape Architect, Chugach National Forest, 5 years  
Landscape Architect, Uinta National Forest, 2 years

**Garvan P. Bucaria**

BA Wildlife Conservation, San Jose State College 1958

MS Fisheries, Oregon State University 1968

MS Science Education, Oregon State University 1973

Forest Service: 11 years

Wildlife Biologist, Supervisor's Office, Chugach National Forest, 4 years  
Wildlife Biologist, Cordova Ranger District, 7 years

**Kenneth W. Rice**

B.S.(Wildlife Management) Humboldt State University 1969

M.S.(Wildlife Management) Humboldt State University 1976

Forest Service: 11 years

Environmental Coordinator, Chugach National Forest, 2 years

Resource Assistant Anchorage RD Chugach National Forest, 5 years

Supervisory Wildlife Biologist, Chugach National Forest, 2 years

Wildlife Biologist, Tongass National Forest, 2 years

**Bob Green**

BS Forestry, Utah State University 1965

Associate Forestry University of Massachusetts 1961

Forest Service: 27 Years

Forester Timber Staff, Chugach National Forest 11 years

Forester Resource Management Assistant Kuiu Island, Tongass National Forest, 2 Years

Forester Timber Management Assistant, Chippewa National Forest 4 Years

Assistant District Silviculturist, Two Ranger District Niccolet National Forest, 7 years

Forester Silviculturist, Jefferson National Forest 1 year

Forestry Aid, White Mountain National Forest, 2 years

**Ann G. Scott**

Forest Service: 14 years

Regional Office, Juneau Alaska 3 years

Chugach NF, 10 years

**Scott W. Lamoreux**

BSLA Rutgers University, 1976

Forest Service: 12 years

Forest Landscape Architect, Chugach National Forest, 2 years

Forest Landscape Architect, Tahoe National Forest, 5 years

Landscape Architect, Tahoe and Dixie National Forests, 4 years

Landscape Architect, National Park Service, National Capital Region, 1 year





# **Chapter 6**

## **Distribution of Document**

# Chapter 6

Continuation of Document

# Distribution of Document

|  |                                     |
|--|-------------------------------------|
| Alaska Department of Fish and Game     | Alaska Department of Transportation |
| Alaska Land Use Council                | Alaska Federation of Natives        |
| National Marine Fisheries SVC. NOAA    | Alaska Loggers Association          |
| Alaska Land Use Advisory Committee     | Alascom                             |
| Fairmont Island Seafoods               | Daniel O'Brien                      |
| Al or Rose Weathers                    | Nancy Bird                          |
| Anchorage Chamber of Commerce          | Cordova Chamber of Commerce         |
| Seward Chamber of Commerce             | Valdez Chamber of Commerce          |
| Whittier Chamber of Commerce           | Alaska Center for the Environment   |
| Alaskan Conservation Foundation        | Alaska Wilderness Studies           |
| Anchorage Audubon Society              | National Audubon Society            |
| Sierra Club                            | Trustees for Alaska                 |
| The Wilderness Society                 | AEIDC                               |
| Department of Natural Resources        | Bran Air                            |
| Bush Pilot's Air Service, Inc          | Chitna Air Service                  |
| Cordova Sportsman Club                 | Frank Moolin and Associates         |
| Joanne Dunec and Associates            | Valdez Convention & Visitors Bureau |
| Wilbur's Flight Operations             | Center for Alaska Studies, PWSOC    |
| Concerned Citizen's Comm. of Whittier  | Cordova Lands Coalition             |
| Friends of Valdez                      | Alaska Land Use Council             |
| Ak Operations Office Env. Prot. Agency | BIA Forestry                        |
| Bureau of Land Management              | Corps of Engineers, Alaska District |
| Corps of Engineers, Regulatory Branch  | National Marine Fisheries Service   |
| National Park Service                  | Soil Conservation Service           |
| US - BIA                               | U.S. Coast Guard                    |
| Office of Environmental Project Review | U.S. Fish and Wildlife Service      |
| U.S. Geological Survey                 | Director of Forestry Sciences Lab   |
| Director of State and Private Forestry | Honorable Frank Murkowski           |
| Honorable Ted Stevens                  | Honorable Don Young                 |
| North Pacific Fishery MGMT. Council    | Blanche Mcsmith Public Library      |
| Institute of Marine Science            | Valdez High School Library          |
| Alaska Women in Timber                 | Eyak Construction Co., Inc.         |
| Koncor Forest Resoure Management       | Postmaster, Seward                  |
| Society of American Foresters          | Timber Trading Company              |
| Whittier Whirlwind                     | Alaska Fishermen's Journal          |
| Anchorage Daily News                   | The Anchorage Times                 |
| Cordova Times                          | KVAK                                |
| The Seward Phoenix Log                 | Sound of Prince William             |
| Valdez Vanguard                        | Municipality of Anchorage           |
| Cordova City Council                   | City of Valdez                      |
| Donald Tlarston                        | Valdez port and Transportation      |
| City of Whittier                       | Whittier Harbormaster               |
| Chenega I.R.A. Council                 | Chugach Alaska Corporation          |
| Eyak Corporation                       | Native Village of Eyak              |
| Tatitlek Corporation                   | Tatitlek Corporation Consultant     |



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|--|-------------------------------------|
| Tatitlek I.R.A. Council                | Valdez Native Association           |
| Alaska Miners Association              | Arctic Tern II                      |
| Jackpot Charters                       | National Outdoor Leadership School  |
| Orca Book and Sound Co.                | Otter Enterprises                   |
| Stan Stephens Charters                 | Alaska Natural History Association  |
| Alaska Sailing Club                    | Anchorage Powerboat Association     |
| Prince William Sound Recreation Assoc. | Resource Development Council for Ak |
| Alaska Board of Forestry               | Ak Dept of Environ. Conservation    |
| Alaska Div. of Marine Transportation   | Ak Div. of Land & Water Management  |
| Alaska Department of Natural Resource  | Alaska Division of Parks            |
| Alaska -DNR/PWS - Bob Laeffer          | Ak-DNR, Division of Forestry        |
| Alaska-DNR/Division of Parks           | Ak Dept of Transportation PWS Area  |
| Fish and Wildlife Protection           | Representative Bette M. Cato        |
| Alaska Visitors Association            | Prince William Sound Comm. College  |
| UA-Marine Institute                    | George Covell                       |
| Northern Resource Company              | Charles Selanoff                    |
| Chugach Alaska Corporation             |                                     |

# **Chapter 7**

## **Literature Cited**





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# **Chapter 8**

## **Glossary**





# GLOSSARY

## **AA**

See Analysis area

## **Activity**

Work conducted to produce, enhance, or maintain outputs or achieve administrative and environmental quality objectives.

## **ADF&G**

Alaska Department of Fish and Game

## **Affected environment**

The natural and physical environment and the relationship of people to the environment that will or may be changed by actions proposed.

## **Alaska Lands Act**

A shortened title for the Alaska National Interest Lands Conservation Act, enacted in 1980.

## **Alaska National Interest Lands Conservation Act (ANILCA)**

Passed by Congress in 1980, this legislation designated 14 national forest wilderness areas in southeast Alaska.

## **Allowable sale quantity**

The quantity of timber that may be sold from the area of suitable land covered by the forest plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."

## **Alternative**

In forest planning, a mix of management prescriptions applied in specific amounts and locations to achieve a desired management emphasis.

## **AMS**

Analysis of the management situation

## **Anadromous**

Refers to those fish--usually salmonids--that spawn (some also rear) in freshwater and spend part of their lives in saltwater.

## **Analysis area**

A specific area (of any size) designated for analysis in the Chugach Land Management plan.

## **Aquatic Habitat Management Unit (AHMU)**

The area of land adjacent to streams, lakes, or estuaries which will be managed primarily to maintain riparian values and fish habitat. They will include the wetlands, associated riparian areas, and adjacent uplands that may have a direct effect on fish habitat. (See Riparian).

**Augmentation**

Total added investment furnished by the Forest Service to a sale that appraises out deficit, in the form of contribution to bring a sale up to 50 percent of the normal profit margin or supplementation, to provide for a construction standard higher than necessary for an economic and safe timber sale.

**Background**

The view beginning 3-5 miles from the observer and extending as far into the distance as the eye can detect the presence of objects.

**Beach Fringe Habitat**

Wildlife habitat that occurs 600 feet inland from the intertidal zone plus islands of less than 50 acres.

**Board Foot**

A measurement of timber volume equal to a board sawn to a dimension of 12 x 12 x 1 inch.

**Carrying Capacity**

The number of animals that a habitat can maintain in a healthy, rigorous condition.

**CFL**

Commercial Forest Land

Forest land that is producing or is capable of producing crops of industrial wood and (a) had not been withdrawn by Congress, the secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting.

**Clearcutting**

The removal, in a single operation, of all merchantable timber in the stand. Natural or artificial means may be used to establish regeneration. Areas clearcut may occur in blocks, patches, or stripes.

**CLMP**

Chugach Land Management Plan. Originally implemented in 1984 and amended in 1986.

**Cultural Resources**

Any evidence of human activities and behavior; includes data from archeology, architecture, ethnology, and history.

**Demand**

The expected harvest level given no restriction on the number of hunters allowed and a season starting August 1 and ending December 31.



**Developed Recreation**

Outdoor recreation requiring significant capital investment in facilities to handle a concentration of visitors on a relatively small area. Examples are ski areas, resorts and campgrounds.

**Dispersed Recreation**

Outdoor recreation use occurring outside a developed recreation site; includes such activities as scenic driving, hunting, backpacking, and boating.

**Distance Zone**

One of three categories used in the visual management system to divide a view into near and far components. The three categories are (1) foreground, (2) middleground, and (3) background. See individual entries.

**Diversity of Habitat**

Implies habitats that are different rather than the same over large areas. For example, some species of wildlife require old growth forests, others thrive on fresh clearcuts or younger even-aged stands. Diversity is the proper mix of these habitats to meet the objectives set.

**Eagle Nest Tree Buffer Zone**

A 330 foot radius around eagle nest trees established in a Memorandum of Understanding between the U.S. Fish and Wildlife Service and the Forest Service.

**Economically Suitable**

A project, program, or activity which meets or exceeds a desirable rate of return or benefit cost ratio.

**Entry**

Harvest of a specified portion of the total rotational volume.

**Estuary**

For purpose of this EIS process, estuary refers to the relatively flat, intertidal, and upland areas, generally found at the heads of bays and mouths of streams. They are dominantly mud and grass flats and unforested except for scattered spruce or cottonwood.

**Existing Visual Condition (EVC)**

A measure of how natural a landscape currently appears, expressed in terms of visual condition levels I through VI.

**Foreground**

The portions of a view starting from the observer and extending up to 1/4 or 1/2 mile away.

**FHMU**

Fish Habitat Management Unit

An area of stream and associated streamside habitat identified during the interdisciplinary process of having fish values of such major importance that land use activities will be prescribed to meet the management goals for fish habitat.

**Flood Plain**

The lowland and relatively flat areas joining inland and coastal waters, including debris cones and flood-prone areas of offshore islands, including at a minimum, that area subject to a 1 percent (100-year recurrence) or greater change of flooding in any given area.

**Forest Land**

Land at least ten percent occupied by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

**Future Visual Condition (FVC)**

A measure of how natural or altered a landscape would look in the future. FVC terminology is generally used to explain the effects upon a landscape that would result from implementation of a management activity or combination of activities. Visual condition levels I through VI are used to define the FVC.

**Guideline**

Any issuance which assists in determining the course of direction to be taken in any planned action to accomplish a specific objective.

**IDT**

Interdisciplinary Team

A group of individuals representing different areas of knowledge and skills focusing on the same task, problem, or subject.

**Inoperable Timber**

Timber which is not practical to harvest because of potential resource damages, economic infeasibility, physical limitations or inaccessibility.

**Irretrievable Commitment**

The production or use of renewable resources that is lost because of allocation decisions. It represents opportunities foregone for the period of time that the resource cannot be used.

**Irreversible Commitment**

Commitment of resources that are renewable only over a long period of time, such as soil productivity, or to nonrenewable resources, such as cultural resources or minerals.

**Key Habitat Areas**

Areas that are productive because of high quality spawning and/or rearing areas for fish, or because of high browse density and protection for animals such as deer.

**Layout**

Generally refers to the paper and aerial photographic planning and mapping of harvest and road systems needed to totally harvest a given geographical area.

**Logging Debris**

Usually woody debris of various sizes that is generated through timber harvest practices. To fish habitat debris can be either harmful or beneficial.

**Log Transfer Facility**

A facility located where the road network terminates. May be used for a number of transportation purposes. For timber harvesting, the terminal transportation facility is where logs are bundled and placed into rafts on the water for towing to local mills. The transfer facility is also called a log transfer facility when the facility is used only for logging.

**LTF**

Log Transfer facility.

**Management Area Analysis (MAA)**

The process used for the evaluation of proposed project alternatives for a given management area in order to determine their feasibility and environmental effects. The analysis will follow the NEPA process, provide opportunity for public comment, and conform to Regional and National Forest Service direction. Multi-entry Layout and Management Area Analysis are the same when the analysis is done for a timber project.

**Management Indicator Species**

A group of species selected as indicators of the effects of management practices. Included are threatened and endangered species, species commonly hunted, fished, or trapped; and species with special habitat needs that may be significantly affected by management activities.

**Management Concern**

An issue or problem requiring resolution, or condition constraining management practices identified by Forest Service management and/or staff.

**Management Emphasis Prescriptions**

Specifically sets forth policies and standards under which management objectives will be carried out. Commonly consists of a comprehensive statement in words, maps, illustrations and other media explaining the means by which objectives can be carried out in pertinent management areas.

**Mass Failures or Mass Movement**

The downslope movement of a block or mass of soil. This usually occurs under conditions of high soil moisture, and does not include individual soil particles displaced as surface erosion.

**Mass Movement**

Any down slope movement of soil, rock, or earth; includes slumps, soil creep, etc.

**MBF and MMBF**

Respectively, thousand board feet and one million board feet.

**Middleground (middle distance)**

The space between the foreground and the background in a landscape. The area located from 1/4-1/2 to 3-5 miles from the viewer.

**Middle Market**



The value and product mix that most closely matches half the absolute difference between the "high market" and the quarter with the lowest appraisal values for end product selling price during the past 10 years. Value and product mix are measured by the R-10 Index Operation and adjusted to current dollars for use.

**Mining**

Includes all operations for the extraction of mineral resources--underground and open pit mines; rock, and sand and gravel borrow; etc.

**Mitigation**

Action or actions taken to avoid or minimize negative impacts of a management activity. Includes avoiding an impact altogether by not taking a certain action or part of an action; minimizing an impact by limiting the degree or magnitude of an action and its implementation; rectifying the impact by limiting by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

**Monitoring**

Following a course of events to determine what changes occur as the result of an action.

**NEPA**

National Environmental Policy Act of 1969.

**NFMA**

National Forest Management Act of 1976.

**Non-Forest Lands**

Lands that never have had or that are incapable of having 10 percent or more of the area occupied by forest trees; or lands previously having such cover and currently developed for nonforest use.

**Output**

The goods, end products, or services that are purchased, consumed, or utilized directly by people. Goods, services, products, and concerns produced by activities which are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. A broad term for describing any result, product, or service that process or activity actually produces.

**Precommercial Thinning**

A type of tree thinning that particularly favors the dominant or selected dominants more or less evenly distributed over the stand by removing a varying proportion of the other trees.

**Prescriptive Plan**

A detailed plan made for a land management action such as a timber sale. Includes imposed restrictions for streamside strips, location of roads, etc.

**Present Net Value (PNV)**

The current value of all discounted incomes minus discounted costs.

**Public Issue**

A subject or question of widespread public interest relating to Forest Service management identified through public participation.

**RPA**

Forest and Rangeland Renewable Resources Planning Act of 1964. Calls for a periodic assessment of the renewable resources of the Nation.

**Recreation Opportunity**

The availability of a real choice for recreationists to participate in a preferred activity within a preferred setting, in order to realize those satisfying recreation experiences which are desired.

**Recreation Opportunity Spectrum (ROS)**

The framework for planning and managing the recreation resource, within which, lands are identified for their ability to provide recreation experiences in one of the six classes along a continuum from primitive to modern-urban. Each class is defined in terms of the degree to which it satisfied certain recreation needs based on area size, the extent to which the natural environment has been modified, the type of facilities developed, and the degree of outdoor skills needed to enjoy the area. The six classes are: (1) primitive representing the most remote, undeveloped and inaccessible opportunities. (2) Semi-primitive non-motorized. (3) semi primitive, motorized. (4) roaded natural. (5) rural, and (6) modern-urban

representing the most developed, accessible and convenience-oriented experience available.

**1.Primitive ROS Class**

Generally includes those areas out of sight and sound of human activities and greater than three miles from roads open to public travel. The areas are larger than 5,000 acres in size with opportunities for a high degree of interaction with the natural environment, challenge, risk and the use of outdoor skills. Because of their remoteness, users of these areas are normally required to stay overnight.

**2.Semi-Primitive Nonmotorized ROs Class**

Generally includes those areas greater than 1/2 mile and less than three miles from roads and trails open to motorized use. The areas are generally larger than 2,500 acres in size with limited opportunities for isolation from the sights and sounds of humans and a high degree of interaction with the natural environment. Moderate challenge, risk, and the opportunity to use outdoor skills are factors in this environment.

**3.Semi-Primitive motorized ROS Class**

Includes areas less than 1/2 mile from primitive roads and trails open to motorized use. Areas are generally larger than 2,500 acres in size and characterized by a predominately unmodified natural environment with minimum evidence of sights and sounds of

humans. Concentration of users is normally low. Road access is not maintained in these areas.

#### **4.Roaded Natural ROS Class**

Include areas less than 1/2 mile from roads open to public travel, railroads, major power lines and within resource modification areas. Areas in this class generally vary in size from 100 to 2,000 acres and are characterized by predominately natural environments, with moderate evidence of sights and sounds of humans. Concentration of users is moderate to low.

#### **5.Rural ROS Class**

Includes those areas within small communities, developed ski areas, and administrative sites. The areas are generally smaller than 500 acres in size and are characterized by substantially modified natural environments. Modifications are primarily to enhance specific recreation activities. Sights and sounds of humans are readily evident. Concentration of users is moderate to high.

#### **6.Modern-Urban ROS Class**

Areas of varying sizes characterized by substantially urbanized environment. The background may have elements of a natural environment. Renewable resource modification and utilization practices are common. Vegetative cover is often exotic and manicured. Sights and sounds of humans predominant. Large numbers of visitors can be expected both on-sight and in nearby areas.

**Regulated Harvest-** The regulated harvest includes any volume included in calculations of the allowable sale quantity which is harvested from suitable commercial forest land. Regulated harvests are therefore those calculated to systematize the production of forest products under principles of sustained yield on an annual or periodic basis.

#### **Resident Fish**

Fish that are not anadromous and that reside in fresh water on a permanent basis. Resident fish include nonanadromous Dolly Varden char and Cutthroat Trout.

#### **Riparian Ecosystems**

Includes wetlands, streams and lakes, and those areas around streams and lakes which can influence the aquatic environment.

#### **Rotation**

The planned number of years between the formation of regeneration of a stand and its final cutting at a specific stage of maturity.

#### **Salvage Cutting**

Cutting primarily to utilize dead and down material and scattered poor risk trees that will not be marketable if left in the stand until the next scheduled harvest.

#### **Sedimentation**

Addition of fine organic or inorganic material to a stream channel. Usually that portion remaining in the streambed gravel.



**Sensitivity Levels**

A measure of peoples concern for scenic quality of the national forests as seen from roads, trails, waterway or other travel routes and from facilities or other areas of the national forest that have significant public use. Level 1 has highest sensitivity and 3, lowest.

**Silvicultural Systems**

A silvicultural or management system is the entire process by which forests are tended, harvested, and replaced. It includes all cultural practices performed during the whole life of the stand, such as regeneration cutting, thinning, and improvement cutting.

There are only two forest management systems available, even-aged and uneven-aged and each results in the production of a forest of distinctive form.

**Silviculture**

Generally, the science and art of cultivating (i.e. growing and tending) forest crops.

More particularly, it is the theory and practice of controlling the establishment, composition, constitution, and growth of forests.

**Site Index**

The height to which a tree will grow under forest conditions in 100 years for most mature tree species in the western United States.

**Soil Hazard Areas**

Mopped areas within which various soil hazards may be encountered. Hazards include mass failures and high sediment production during road construction.

**Stand**

A community of trees or other vegetation sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities and so form a silvicultural or management entity.

**Standard Logging Systems**

Referred to as normal logging systems in the Timber and Silviculture Resource Report. These are systems commonly used today including highlead, A-frame, single span skyline (skyline with a reach less the 2600 feet) and tractor.

**Streamside Management Techniques (Prescription)**

A riparian area management prescription that described protective measures so that resource development activities do not adversely affect the maintenance of riparian area dependent resources. Preferential consideration is given to riparian area dependent resources over other resources and activities when conflicts occur.

**Stream Habitat Zone (SHZ)**

A mapping unit based on channel type and landform information which displays the area where there is a high probability of anadromous fish habitat.

**Suitability**

The appropriateness of applying certain resource management practices to a particular unit of land, as determined by an analysis of the economic and environmental conse-

quences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

**Suitable Forest Land**

Land to be managed for timber production on a regulated basis.

**Temperature Sensitive Streams**

Those streams flowing out of lakes or muskegs, or for some other reason susceptible to warming beyond an acceptable level determined by the interdisciplinary process.

**Tentatively Suitable Forest Land**

Forest land that is producing or is capable of producing crops of industrial wood and (a) had not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvesting; (d) adequate information is available to project responses to timber management activities.

**Threatened Species**

Any species of animal or plant which is likely to become an endangered species within the foreseeable future throughout all or a portion of its range.

**Transportation Corridor**

A delineated geographic area through which roads, waters, and air routes pass.

**Unproductive Forest Lands**

Land with more than 10 percent cover of commercial tree species but not qualifying as Commercial Forest Land.

**Unregulated**

Areas considered impractical for timber harvest and not considered when calculating commercial land forest area. These areas include slopes over 75% and V-shaped stream channel (generally on steep-mountainous landscapes). V-notch drainages may be shallow to many feet deep and may be eroded into rock, till or other types of substrate.

**Unsuitable Forest Land**

Forest land not managed for timber production because: (a) Congress, the Secretary, or Chief has withdrawn it; (b) it is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils productivity, or watershed conditions; (d) there is no reasonable assurance based on existing technology and knowledge, that it is possible to restock lands within 5 years after final harvest, as reflected in current research and experience; (e) there is, at present, a lack of adequate information about responses to management activities; or (f) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the forest plan.

**Variety Class**

A classification system with three visual landscape categories that identify the natural scenic quality of the landscape based upon its degree of variety or diversity.

**Viable Population**

A wildlife or fish population of sufficient size, demography and dispersion to maintain its existence over time in spite of normal fluctuations in population levels.

**Viewshed**

The landscape seen or potentially seen from a travel route, use area, or water body.

**Visual Condition level**

A measure of the degree of human-caused alternation of a landscape from its natural condition.

**Visual Quality Index (VQI)**

A numerical rating of the composite scenic quality of a large area. It reflects both the inherent natural scenic value and the amount of human modification of the landscape. It is correlated to public preference ratings of these two characteristics, which give higher values to landscapes with more natural diversity and more natural appearance.

**Visual Quality Objectives (VQO's)**

Measurable standards reflecting five different degrees of man made alteration of the natural landscape. The five objectives are (1) Preservation (2) Retention (3) Partial Retention (4) Modification (5) Maximum Modifications. "Inventory" VQO's reflect analysis involving other resources and become management alternative.

**(1)Preservation**

Allows only ecological changes. Management activities, except for very low visual impact recreation facilities, are prohibited. This objective applies to specifically classified areas including wilderness.

**(2)Retention**

Provides for management activities which are not visually evident. Management activities are permitted but the results of those activities on the natural landscape must not be evident to the average viewer.

**(3)Partial Retention**

Management activities may not be evident to the viewer, but must remain visually subordinate to the surrounding landscapes.

**(4)Modification**

Management activities may visually dominate the original surrounding landscape but must borrow from naturally established form, line, color and texture.

**(5)Maximum Modification**

Land management activities can dominate the natural landscape to a greater extent than in the modification objective except as viewed from background when visual characteristics must be those of natural occurrences within the surrounding area.



**Waters of the United States**

Include

- (1)The territorial seas;
- (2)Coastal and inland waters, lakes, rivers, and streams that are navigable, including adjacent wetlands.
- (3)Tributaries to navigable waters, including adjacent wetlands;
- (4)Interstate waters and their tributaries, including adjacent wetlands; and
- (5)All other water such as isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not part of a tributary system to interstate waters or to navigable water.

**Wetlands**

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

**Wildlife Habitat Management Unit**

An area of wildlife habitat identified during the IDT process as having values important to wildlife.

# Chapter 9

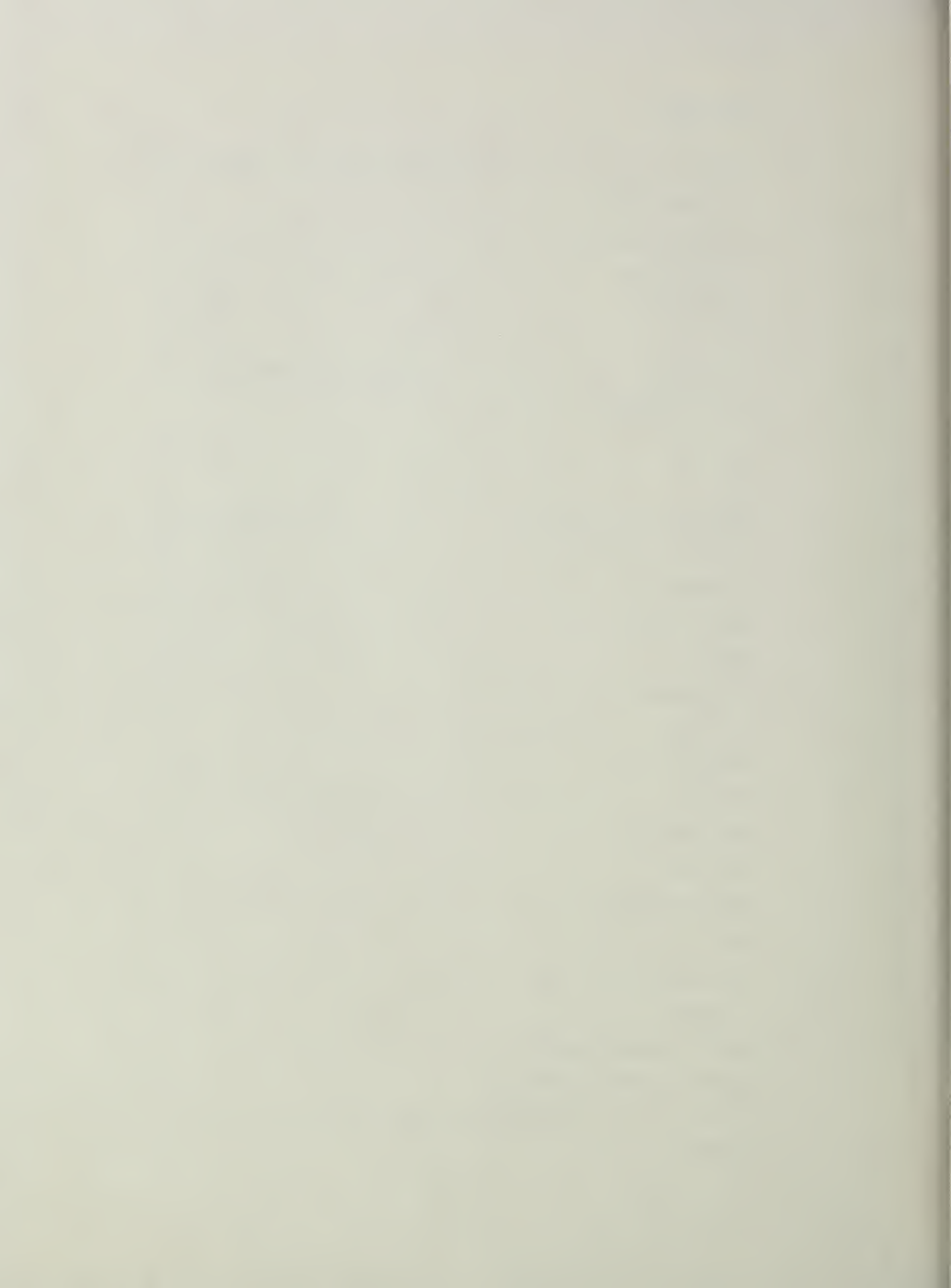
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| Recreation . . . . .                        | 2.12,2.55,2.43,2.45,2.49,2.51                               |
| Recreation Management . . . . .             | 1.11,2.10   |
| Regeneration . . . . .                      | 4.62  |
| Research Natural Area . . . . .             | 2.10  |
| Soils . . . . .                             | 3.34,4.110  |
| Special Uses . . . . .                      | 1.6,2.3,2.52,3.1,4.1  |
| Subsistence . . . . .                       | 3.36,4.113  |
| Summary of Public Comments . . . . .        | 1.5   |
| Threatened and Endangered Species . . . . . | 3.8   |
| Timber . . . . .                            | 2.12,2.15,1.11,2.10,2.43,2.45,2.48,2.51,2.54,2.51,3.47,4.56 |
| Tourism . . . . .                           | 3.46  |



# Appendices





# **Appendix A**

## **Settlement Agreement**





USDA FOREST SERVICE  
CHUGACH NATIONAL FOREST  
201 E. 9th  
Anchorage, AK 99501

DECISION NOTICE  
and  
FINDING OF NO SIGNIFICANT IMPACT  
for  
IMPLEMENTATION OF AN AGREEMENT  
TO SETTLE THE APPEAL OF THE  
CHUGACH NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN

An Environmental Analysis has been completed on the effects of implementing a negotiated agreement with the appellants of the 1984 Forest Plan, closing that appeal. The analysis is documented with an Environmental Assessment (EA) describing four alternatives, including fully implementing the agreement (the preferred alternative).

Under the preferred alternative the Forest Service and the Sierra Club and 17 other appellants agree to amend the Chugach National Forest Land and Resource Management Plan. Summarized, the amendment would entail four broad actions as follows:

First, the Forest Service agrees to adopt interim management measures to increase assurance that the current character of specific portions of the Forest is maintained. Second, the Forest will undertake a series of NEPA-based analyses on the nine Management Areas during the next 7 years to supplement existing data and to amend the Forest Plan. Thirdly, the Forest agrees to lower the timber offerings from the Plan level of 16.9 million board feet (mmbf) annually to a level not to exceed 6.3 mmbf for the first five years and 10.6 mmbf for the second five years in order to provide time to further assess the timber market situation in Southeast Alaska. Fourthly, the appellants agree to participate in the accomplishment of the above steps and not to initiate or pursue any further direct appeal or judicial review of the Chugach Forest Plan. The agreement does not affect any prior existing rights and contains wording to that effect. The agreement contains other specific provisions which are described in the agreement itself, which is attached.

It is my decision, based on the analysis and evaluation of the agreement and alternatives to it, to implement the proposed action (preferred alternative).

Environmental impacts of the preferred alternative would not exceed those already documented in the Forest Plan Final EIS. The agreement is consistent with the management plans of other Federal, State and local agencies including Coastal Zone Management plans. As a result of an ANILCA 810 evaluation, it is my conclusion that the proposed action would not significantly restrict subsistence uses.

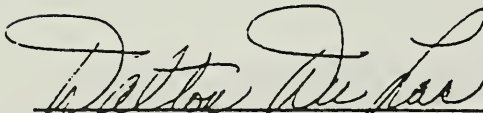
This is not a major Federal action that would significantly affect the quality of the human environment; therefore, an environmental impact statement will not be prepared. This determination was made considering the following factors; a) no known threatened or endangered plants or animals are within the affected area; b) there are no apparent significant adverse cumulative or secondary effects; and c) no wetlands or floodplains or cultural resources will be affected by the proposed action.

Implementation of the agreement is an amendment to the Forest Land and Resource Management Plan. It is not a significant amendment due to the minor degree of the proposed changes compared with the actual level of programs and overall management direction in the Plan. Changes in management direction for specific areas of the Forest are of an interim nature. Further analysis prescribed by the agreement is not itself a change in management direction or production of goods and services from the Forest. Any changes identified as desirable as a result of such analysis will be considered at that time as a future proposed amendment to the Plan under 36 CFR 219 procedures.

In accordance with 36 CFR 219.10(f) implementation of a non-significant amendment to a Forest Plan is the responsibility of the Forest Supervisor. The Regional Forester will also sign this Decision Notice since he was the Forest Service official signing the agreement with the appellants.

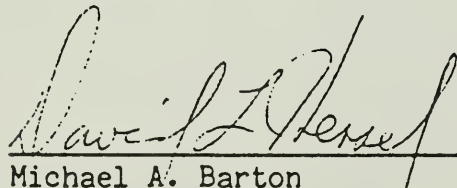
This decision is subject to administrative review in accordance with 36 CFR 211.18.

Implementation may take place 30 days subsequent to this date.



Dalton Du Lac  
Forest Supervisor  
Chugach National Forest  
201 E. 9th Street  
Anchorage, AK 99501

January 7, 1986  
Date



For  
Michael A. Barton  
Regional Forester  
Alaska Region  
Box 1628  
Juneau, AK 99802

1/7/86  
Date



APPELLANTS:

Sierra Club, Alaska Chapter;  
Wilderness Society; Alaska  
Wilderness Sailing Safaris, Inc.;  
National Audubon Society; Cordova  
District Fisheries United; Otter  
Enterprises; Stella Polaris Charters;  
Alaska Marine Charter Services;  
Stan Stephens Charters; Simpson's  
Marine Charters; Jackpot Charters;  
Arctic Tern II Leasing; National  
Outdoor Leadership School; Prism  
Ski Touring; Knik Kanoers and  
Kayakers, Inc.; North Gulf Oceanic  
Society; and Natural History Ventures

36 CFR 211.18  
APPEAL OF REGIONAL  
FORESTER APPROVAL OF  
CHUGACH NATIONAL FOREST  
LAND AND RESOURCE  
MANAGEMENT PLAN

INTERVENORS:

Southeast Alaska Conservation Council  
Alaska Resource Development Council

CHRONOLOGY

The Sierra Club and 17 other Appellants filed, on August 17, 1984, an administrative appeal of the Regional Forester's decision to approve the Land and Resource Management Plan of the Chugach National Forest ("Chugach Forest Plan"). This Notice of Appeal was amended by the Appellants on September 10, 1984. The Appellants' Statement of Reasons for the appeal was filed on October 10, 1984. The Regional Forester of the Alaska Region filed a Responsive Statement on December 10, 1984. The Appellants then filed a reply to the Responsive Statement on December 31, 1984. Thomas R. Anthony, Richard W. Tindall, the Alaska Resource Development Council and the Southeast Alaska Conservation Council requested intervenor status in the appeal. On November 26, 1984, the Chief of the Forest Service denied the requests of Thomas R. Anthony and Richard W. Tindall for intervenor status. On December 14, 1984, the Chief of the Forest Service initially denied intervenor status to the Southeast Alaska Conservation Council. Upon review of subsequent information, the Southeast Alaska Conservation Council was granted intervenor status on February 5, 1985. The Alaska Resource Development Council was also granted intervenor status on February 5, 1985. On January 23, 1985, the Chief of the Forest Service agreed to suspend the appeals process until April 10, 1985, to allow time for negotiations on the issues presented in the appeal. Further suspensions have been authorized by the Chief to allow negotiations to proceed.

In order to resolve the issues raised in the appeal without the necessity for further proceedings, the Regional Forester and all Appellants agree to the following:



## AGREEMENT

### I. Forest Service Actions:

A. The Regional Forester agrees to cause amendment of the Forest Plan as necessary to incorporate the following interim management measures:

1. As indicated in the Forest Plan and July 27, 1984, Record of Decision, until completion of Congressional action on the Wilderness Study Area, the Nellie Juan and College Fiord Management Areas will be managed to be consistent with the wilderness management guidelines in ANILCA. Should Congress enact legislation on the Wilderness Study Area designation question prior to revision of the Forest Plan, any portion of the Study Area not designated as Wilderness will be managed consistent with maintaining Recreation Opportunity Spectrum (ROS) class Semi-Primitive Non-Motorized conditions (see Appendix A - ROS Setting Characteristics and ROS Experience Opportunities), subject to valid existing rights, until the Forest Plan is revised.

2. Hinchinbrook Island (Management Area #8), Russian River/Resurrection River (Management Area #4) and Eastern Copper River/Martin River (Management Area #9) (See boundary maps enclosed as Appendix B):

a. Subject to valid existing rights, these areas will be managed consistent with maintaining Primitive II ROS class conditions until the Plan is revised (see Appendix A - ROS Setting Characteristics and ROS Experience Opportunities).

b. The Forest Service will not schedule timber harvesting or related timber road construction in these areas prior to the revision of the Plan. Other resource management activities consistent with the Primitive II ROS classification may be initiated prior to the revision of the Plan.

c. Subject to valid existing rights, the Forest Service will require the effects of activities undertaken by others on National Forest System lands to be mitigated to the extent practicable to be consistent with maintaining Primitive II ROS class conditions.

3. Copper River (Management Area #9). In addition to the management direction contained in the Chugach Forest Plan, the July 27, 1984, Record of Decision, and section I.A.2. of this Agreement:

a. Subject to valid existing rights, the Forest Service will not schedule any timber harvest, timber road or other Forest Service road construction, nor will the Forest Service recommend surface occupancy for mineral leasing outside the Copper River road corridor, prior to publication of final regulations pursuant to ANILCA 501(b) or prior to completion of Management Area Analysis for the Copper River Management Area, whichever is earlier.

- b. Timber harvest, related timber road construction, other Forest Service road construction and recommendations for surface occupancy for mineral leasing within the Copper River road corridor may be undertaken to the extent and in a manner consistent with the conservation of fish and wildlife and their habitat.
- c. Recreation development, fish and wildlife enhancement projects, research projects and similar management activities may be undertaken within or outside the road corridor, to the extent and in a manner consistent with the conservation of fish and wildlife and their habitat.
- d. The management direction in paragraphs a, b and c above may be modified or superceded by the provisions of final regulations implementing Section 501(b) of ANILCA.
- e. Subject to valid existing rights, prior to the revision of the Forest Plan the Forest Service will not schedule any timber harvest or timber-related road construction within the Lower Bering River area between the Primitive II area shown in Appendix B-3 and the 173,000-acre area east of the Bering River discussed on page 5 of the Record of Decision for the Final Environmental Impact Statement for the Chugach National Forest Land and Resource Management Plan.
4. a. The level of timber sale offering will not exceed an annual average of 6.3 million board feet for the first five years and 10.6 million board feet for the second five years of the Ten-Year Timber Action Schedule attached as Appendix C. This will allow time to further assess the viability of a renewed timber industry in southcentral Alaska; to further monitor and evaluate the market projections incorporated in the Forest Plan; and to complete Management Area Analysis for Management Areas where Forest Service timber harvesting and timber management related road construction activities are scheduled to occur.
- b. The Ten-Year Timber Sale Action Schedule may be modified pursuant to the implementation and amendment provisions of 36 CFR 219.10(e) and (f) (1982), without violating the terms of this agreement, as long as:
- i. the modification does not result in levels of timber sale offerings exceeding the applicable annual average of Section I.A.4.a. of this Agreement, and
  - ii. the modification does not result in scheduling of timber harvest activities in areas excluded from scheduling of timber harvest by the terms of this Agreement, the Forest Plan, or the July 27, 1984, Record of Decision.
5. Applicable Alaska Regional Guide standards and guidelines will be expressly incorporated by reference in the Plan.
6. Public disclosure of the timber sale schedule and direction described above will be made within 30 days of the finalization of this settlement, and implemented as an amendment to the Forest Plan pursuant to 36 CFR 219.10(f) (1982).



7. Modification of this management direction may be considered and implemented prior to the revision of the Plan, but only in accordance with 36 CFR 219.10(e), (f), or (g) (1982), or succeeding regulations and only as consistent with items I.A.1. through I.A.4. above.

8. The Forest Service may take such measures as may be necessary to control fire, insects, or diseases, without violating the terms of this agreement.

B. The Regional Forester agrees that the Forest Service will complete Management Area Analyses according to the schedule enclosed as Appendix D, subject to the limits of available funding and personnel. Management Area analyses will be prepared following NEPA procedures, will be tiered to the Forest Plan EIS, will be consistent with the terms of this Agreement, and may result in an amendment or revision of the Forest Plan pursuant to 36 CFR 219(e), (f) or (g) (1982), or succeeding regulations. Management Area analyses will be circulated for public comment and will provide sufficient information and analysis to reasonably address the topics described below on a Management Area-wide basis.

1. Minerals Area Management - a. Current and projected mineral exploration and development in the management area will be considered in developing surface resource management direction tiered to forest plan direction, based on available government and other nonproprietary information.

b. To the extent practicable, the following will be identified in reasonable detail:

1. Current and projected future location and level of development of active mining claims, patented or unpatented.

2. Location of probable occurrences of substantial deposits of locatable, leasable, and common variety minerals.

3. Current and projected future access needs for exploration and development of active mining claims and areas of probable mineral occurrence.

4. Potential environmental effects of current and projected future exploration and development.

c. To the extent practicable, alternative measures to prevent or mitigate environmental impacts will be considered, including the potential need for withdrawal of areas from mineral entry or development, consistent with the requirements of 36 CFR 219.22(d) (1982) or succeeding regulations and NEPA.

d. In selecting mitigating measures for incorporation into management prescriptions or other direction, the probable effect of such measures on mineral resources and exploration and development activity will be considered.

2. Recreation - Current recreation use and other pertinent data from the Forest Service Recreation Information Management System (RIM) and other sources will be incorporated into the analysis.



3. Timber - a. Current inventory data will be incorporated. Preliminary detail on actual timber sale area locations will be provided. Particular and final timber sale layout, however, will be addressed in individual timber sale NEPA documents tiered to the MAA and Plan.  
  
b. Prior to completion of MAA, timber harvesting and other resource development activities within the road corridors on the Kenai Peninsula and on the Copper River Delta will be implemented utilizing appropriate NEPA project analysis.
4. Subsistence - An analysis of the effects of proposed management actions on subsistence will be made according to the requirements of ANILCA Section 810.
5. Transportation Planning - Reasonable alternative transportation systems (e.g., roads, trails, log transfer facilities) will be addressed, including effects on resources. Specific transportation facility locations attributable to individual projects will be addressed in individual project NEPA documents tiered to MAA and the Plan.
6. Land Selections - The effects of Chugach Alaska Corporation (CAC), formerly Chugach Natives Incorporated (CNI), and other land selections on the Management Area will be addressed.
7. Standards and Guidelines - Standards and guidelines applicable to the Management Area, including those related to management of riparian areas and soil hazard areas, will be reassessed and updated, if necessary.
8. Environmental Impacts - Effects of proposed management actions on the environment, including wilderness characteristics of roadless areas, will be analyzed in accordance with NEPA.

## II. Appellant Actions:

- A. Each Appellant agrees to participate to the extent practicable in all steps described in Section I above, provided that the Forest Service provides the Appellant actual notice at the stage where participation is appropriate.
- B. Each Appellant agrees not to initiate or pursue any further direct appeal or judicial review of the Chugach Forest Plan, EIS or Record of Decision. Each Appellant agrees that in the event any Appellant or member, representative, or successor thereof initiates or pursues further direct appeal or judicial review of the Chugach Forest Plan, EIS or Record of Decision, any Forest Service agreement or obligation herein is discharged and void.
- C. Each Appellant reserves any rights to initiate and pursue appeals or judicial review of any future Forest Service actions, including future NEPA documents relating to actions on the Forest, on the basis of any issues other than specific claims raised in their August 17, 1984, appeal of the Chugach Forest Plan, EIS, and Record of Decision. Each Appellant agrees that initiation or pursuit, by any Appellant or member, representative, or successor thereof, of any further appeal or litigation realleging any claims raised in the August 17, 1984, appeal of the Chugach Forest Plan, EIS, and Record of Decision voids any Forest Service agreement or obligation herein affected by the appeal or litigation.

D. Each Appellant agrees that the interim management direction and amendment of the Chugach Plan described in I.A. above do not constitute an amendment of the Chugach Plan that would result in a significant change in the Plan for purposes of 36 CFR 219 or the National Forest Management Act, and do not require the preparation of an environmental assessment or additional Environmental Impact Statement for purposes of the National Environmental Policy Act or other applicable law or regulation.

### III. OTHER PROVISIONS

A. Purpose, Effect, and Use of Agreement: Appellants and the Regional Forester concur that this Agreement binds them only as provided herein. This Agreement is entered into for the purposes of settling the issues raised in this appeal with respect to the Chugach National Forest only, and for no other purpose. This Agreement shall not be cited or otherwise relied on in any appeal or legal proceedings, whether judicial or administrative in nature, in which any Appellant or the Forest Service or their respective counsel have, or may acquire, an interest, except as is necessary to effect the terms of this Agreement. Provided; this Agreement shall be made part of the record in the current appeal. This Agreement shall not be evidence of any agreement by the Forest Service with any allegations raised by any Appellant or Intervenor in this appeal, nor evidence of any agreement by any Appellant to any allegation raised by the Forest Service or any Intervenor in this appeal.

B. Intervenor and Third Parties: Any intervenor or third party having an interest in this proceeding may elect to join this Agreement. Signature of this Agreement by any Intervenor or other third party, or authorized representative thereof, shall bind the Intervenor or third party as if the Intervenor or third party were an Appellant. Provided, this agreement shall continue in full force and effect between the Forest Service and Appellants, notwithstanding any action by a signing Intervenor or third party, subject to III.C. below.

C. Severability/Termination Due to Frustration of Purpose: Appellants and the Regional Forester agree that if any part of this Agreement shall be determined unlawful by a court of competent jurisdiction, all other lawful terms shall remain in full force, unless the entire purpose of this Agreement is frustrated thereby. Appellants and the Regional Forester agree that if a ruling by a court of competent jurisdiction or a final decision by the Chief of the Forest Service or senior official of the Department of Agriculture in the event of a continuation of the present appeal, requires the Forest Service to withdraw or undertake significant amendment or revision of the Chugach Plan, the entire purpose of this Agreement is frustrated thereby. In such event, the Agreement shall terminate upon such withdrawal or initiation of such amendment or revision process.

D. Other Termination: This Agreement shall otherwise terminate upon implementation of any revision of the Chugach Land and Resource Management Plan pursuant to 36 CFR 219.10(f) or (g) (1982) or succeeding regulations.



E. Valid Existing Rights/CNI Agreement: This Agreement is subject to any valid existing rights of entities who are not parties to this Agreement. Nothing in this Agreement will be construed to modify any terms or conditions of the 1982 CNI Settlement Agreement, including any transportation corridors through areas to be managed consistent with ROS Primitive II conditions.

F. Attorney Fees/Costs: All questions pertaining to Appellants' entitlement to costs and attorney's fees and the amounts thereof are specifically reserved for subsequent resolution either by the parties or by a court of competent jurisdiction. The Forest Service and all Appellants do not admit to any liability for any such fees or costs alleged by any other party.



APPELLANTS:

Sierra Club, Alaska Chapter;  
Wilderness Society; Alaska  
Wilderness Sailing Safaris, Inc.;  
National Audubon Society; Cordova  
District Fisheries United; Otter  
Enterprises; Stella Polaris  
Charters; Alaska Marine Charter  
Services; Stan Stephens Charters;  
Simpson's Marine Charters; Jackpot  
Charters; Arctic Tern II Leasing;  
National Outdoor Leadership School;  
Prism Ski Touring; Knik Kanoers and  
Kayakers, Inc.; North Gulf Oceanic  
Society; and Natural History Ventures

UNITED STATES DEPARTMENT OF  
AGRICULTURE, FOREST SERVICE  
Regional Forester, R-10

By

Michael A. Barton  
Michael A. Barton,  
Regional Forester

Date

11/26/85

By

Lauri J. Adams  
Lauri J. Adams  
Sierra Club Legal Defense Fund, Inc.  
Attorney for Appellants

By

/s/  
Peter Kirby  
Wilderness Society  
Attorney for Appellant Wilderness Society

Date

November 22, 1985

INTERVENORS:

Southeast Alaska Conservation Council

By

\_\_\_\_\_

Date

\_\_\_\_\_

Alaska Resource Development Council

By

\_\_\_\_\_

Date

\_\_\_\_\_

CHUGACH NATION FOREST  
TEN-YEAR TIMBER ACTION SCHEDULE

| <u>FISCAL</u><br><u>YEAR</u>                     | <u>MGT AREA/</u><br><u>DISTRICT</u> | <u>SALE NAME</u>          | <u>LOCATION</u>  | <u>ESTIMATED</u><br><u>VOL. (MMBF)</u> |
|--|-------------------------------------|---------------------------|------------------|--|
| 1985   | 1/03                                | Johns Creek               | Mile 40          | 1.3                                    |
|  | 1/03                                | East Side #2              | Mile 41          | .4                                     |
|  | 1/03                                | Misc. Sm. Sales           | District Wide    | .1                                     |
|  | 1/03                                | Old Sterling              | Tern Lake        | .3                                     |
|  |                                     |                           |                  | <u>2.1</u>                             |
| 1986   | 1/03                                | Guard Stat. #2            | Hope Rd.         | .5                                     |
|  | 1/03                                | Misc. Sm. Sales           | District Wide    | .9                                     |
|  | 1/03                                | Snug Harbor #2            | Snug Harbor Rd.  | .6                                     |
|  |                                     |                           |                  | <u>2.0</u>                             |
| 1987   | 1/03                                | Canyon Creek              | Mile 44          | .5                                     |
|  | 1/03                                | Bay Creek                 | Hope Rd.         | .2                                     |
|  | 1/03                                | Sunrise                   | Mi. 45 Sterling  | .5                                     |
|  | 1/03                                | Summit Salvage            | Lower Summit Lk. | .4                                     |
|  | 1/03                                | Misc. Sm. Sales           | District Wide    | .7                                     |
|  |                                     |                           |                  | <u>2.3</u>                             |
| 1988   | 9/02                                | Saddlebag HL/FW           | Mile 25          | .5                                     |
|  | 1/03                                | Boston Bar                | Hope Rd.         | .5                                     |
|  | 1/03                                | Granite Cr. No.A/B        | Granite Cr.      | .5                                     |
|  | 1/03                                | Sunset Cr.                | Hope Rd.         | .5                                     |
|  | 1/03                                | Blackstone Canyon         | Res. R. Rd.      | .4                                     |
|  | 1/03                                | Misc. Sm. Sales           | District Wide    | .4                                     |
|  |                                     |                           |                  | <u>2.8</u>                             |
| 1989   | 7/02                                | St. Matthews & Olson Bays |                  | 20.0                                   |
|  | 1/03                                | Misc. Sm. Sales           | District Wide    | .7                                     |
|  | 1/03                                | Russian River             |                  | 1.5                                    |
|  |                                     |                           |                  | <u>22.2</u>                            |
| First Five Years = 6.28 MMBF/Year Annual Average |                                     |                           |                  |  |
| 1990   | 3/03                                | Juneau Cr. East           | Juneau Creek     | .5                                     |
|  | 1/03                                | Palmer Creek #3           | Palmer Creek     | .5                                     |
|  | 1/03                                | Misc. Sm. Sales           | District Wide    | 1.0                                    |
|  |                                     |                           |                  | <u>2.0</u>                             |
| 1991   | 1/03                                | Snow River                |                  | 5.0                                    |
|  | 1/03                                | Misc. Sm. Sales           | District Wide    | .5                                     |
|  |                                     |                           |                  | <u>5.5</u>                             |

# APPENDIX C (cont)

## CHUGACH NATION FOREST TEN-YEAR TIMBER ACTION SCHEDULE

| <u>FISCAL</u><br><u>YEAR</u> | <u>MGT AREA/</u><br><u>DISTRICT</u> | <u>SALE NAME</u> | <u>LOCATION</u> | <u>ESTIMATED</u><br><u>VOL. (MMBF)</u> |
|------------------------------|-------------------------------------|------------------|-----------------|--|
| 1992                         | 8/02                                | Big Island       | Montague        | 36.0                                   |
|                              | 1/03                                | Misc. Sm. Sales  | District Wide   | <u>2.0</u>                             |
|                              |                                     |                  |                 | 38.0                                   |
| 1993                         | 9/02                                | McKinley         | Cordova Road    | 2.0                                    |
|                              | 1/03                                | Gunshop          | Mile 16         | 1.5                                    |
|                              | 1/03                                | 6 Mile           | 6 Mile Creek    | <u>2.0</u>                             |
|                              |                                     |                  |                 | 5.5                                    |
| 1994                         | 3/03                                | Juneau Ck West   | Juneau Creek    | 1.5                                    |
|                              | 1/03                                | Misc. Sm. Sales  | District Wide   | <u>.5</u>                              |
|                              |                                     |                  |                 | 2.0                                    |

Second Five Year = 10.6 MMBF/Year Annual Average

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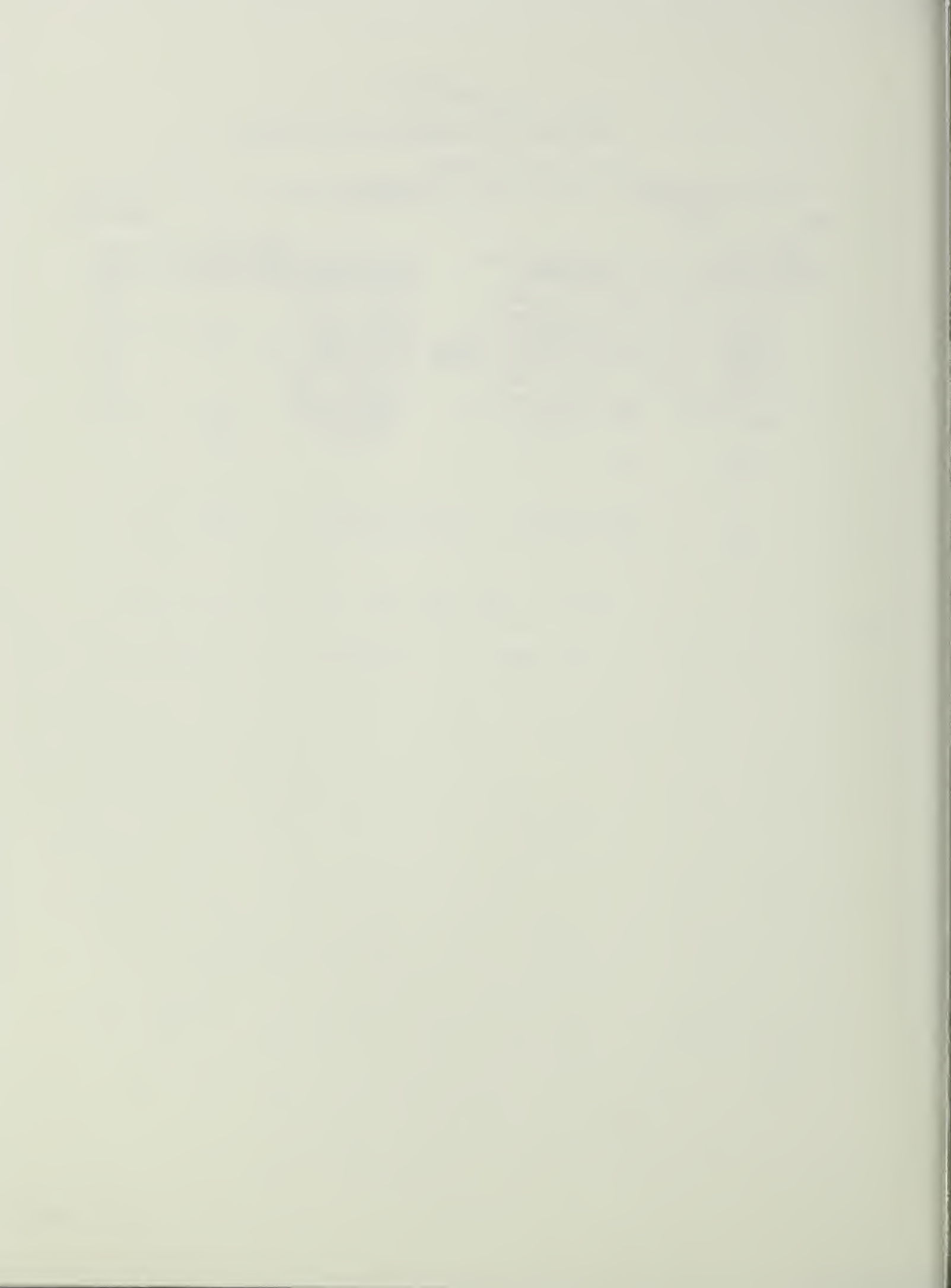
|           |              |            |           |
|-----------|--------------|------------|-----------|
| Districts | 01=Anchorage | 02=Cordova | 03=Seward |
|-----------|--------------|------------|-----------|



## APPENDIX D

## SCHEDULE FOR MANAGEMENT AREA ANALYSIS

| <u>No.</u> | <u>Management Area</u><br><u>Title</u> | <u>District (No.)</u>    | <u>Proposed</u><br><u>Completion</u> |
|------------|--|--------------------------|--------------------------------------|
| 1          | Road Corridor, Kenai Peninsula         | Anchorage/Seward (01/03) | 1988                                 |
| 2          | East Side, Kenai Peninsula             | Anchorage/Seward (01/03) | 1989                                 |
| 3          | Resurrection, Kenai Peninsula          | Seward (03)              | 1988                                 |
| 4          | Crescent Lake, Kenai Peninsula         | Seward (03)              | 1991                                 |
| 5          | Nellie Juan, Prince William Sound      | Anchorage (01)           | 1992                                 |
| 6          | College Fiord, Prince William Sound    | Anchorage (01)           | 1992                                 |
| 7          | Gravina, Prince William Sound          | Cordova (02)             | 1987                                 |
| 8          | Big Islands, Prince William Sound      | Cordova (02)             | 1990                                 |
| 9          | Copper River                           | Cordova (02)             | 1989                                 |



## **Appendix B**

# **Outfitter and Guide Social Carrying Capacity Process**





## Rationale for Estimates of Outfitter-Guide Capacity

The approach used in this analysis for estimating social carrying capacity is based on the process delineated in the 1986 ROS Book. The process was modified using the most recently available literature on determination of carrying capacity and especially outfitter/guide allocation where available. The end result, estimated carrying capacity in terms of number of campsites, resulted from issues pertinent to this Management Area. Social carrying capacity may be calculated for day use (number of persons at one time PAOT per area), number persons/mile trail, number of parties encountered per day, or number of campsites per area). This analysis used campsites as the basis for the O/G use level determination because that best met the information needs of the district.

Issues surfaced in early 1987 as a result of O/G requests for overnight campsites in eastern Prince William Sound. In addition, some questions during scoping for BI centered on where, how many and when O/G permits would be allowed. A February 2, 1987 Environmental Assessment for Tent platforms on Eastern Prince William Sound stated in part "A larger scale analysis which evaluates all protected bays and anchorages will be deferred until Management Area Analysis (MAA)."

Those questions are best answered by estimating the number of overnight sites for outfitter use for each area or protected bay. The rationale for this statement is that a basic recreation management objective is to maintain the desired recreation opportunity for a given area. The qualities that comprise the desired recreation setting and/or opportunity are described in the Recreation Opportunity Spectrum (ROS) 1/ for that area. The MAA process validates the inventoried ROS class (or proposes changing it).

An integral element of the ROS is the social carrying capacity and issuing new O/G permits has the potential to affect this. The applicable premise for the BI area is that each area or bay can only hold so many parties at one time and still maintain the desired recreation experience. That number is dependent on the ROS objective and other factors outlined below. (The number of person per party varies by ROS class and that number is indicated in the MAA wide standards and guidelines ROS charts). Therefore an analysis was undertaken to determine the maximum number of sites (or parties at one time) for each area or protected bay. During that analysis, the following factors were also considered:

1. existing and potential recreation facilities
2. existing Outfitting and Guiding permits
3. availability of O/G opportunities such as hunting and fishing
4. current public use levels
5. physical characteristics such as usable area, amount and type of vegetation for screening, and fragility of the natural environment

1/ ROS is comprised of three elements: 1) activities, 2) setting and 3) experiences.





# **Appendix C**

## **MIS Monitoring Plan**

THE  
JOURNAL OF THE  
ROYAL ANTHROPOLOGICAL INSTITUTE  
OF GREAT BRITAIN AND IRELAND  
VOLUME 34. PART 1. 1904.

## MONITORING PLAN FOR MANAGEMENT INDICATOR SPECIES

The Forest Service has selected 10 Management Indicator Species (MIS) to represent the wildlife and fish species of the Big Island Management Area. Monitoring the status of these species and/or their habitats provides an estimate of the effects of management actions on the groups of animals they represent (Sidle and Suring 1986). Monitoring will emphasize Sitka black-tailed deer, bald eagles, pink salmon, and coho salmon due to management concerns and public issues identified during the planning process. Monitoring intensity will be greatest on the south portion of Montague Island due to the proposed management activities in that area.

The following table shows the level and type of monitoring to be implemented by the Forest Service. A detailed description of the monitoring techniques is available from the Supervisor's office of the Chugach National Forest. Monitoring techniques and frequency will be reassessed and validated by the results of the initial monitoring efforts. Monitoring will be modified as new inventories and techniques become available.



| MANAGEMENT<br>INDICATOR SPECIES | GENERAL<br>HABITAT TYPE        | FOCUS OF<br>MONITORING                      | MONITORING<br>FREQUENCY       | RELIABILITY<br>OF SAMPLING |
|---------------------------------|--------------------------------|---|-------------------------------|----------------------------|
| SITKA BLACK-<br>TAILED DEER     | Mature Forest                  | Winter range habitat<br>Hunting             | Annually                      | High                       |
| BALD EAGLE                      | Mature Forest<br>Coastal snags | Nest & Roost Habitat<br>National Concern    | 2 - 3 Years                   | High                       |
| BROWN BEAR                      | Mature Forest                  | Bear-Human Conflicts                        | Annually                      | Moderate                   |
| MONTAGUE VOLE                   | Muskegs<br>Uplifted beach      | Candidate T & E species                     | Annually,<br>First 5 years    | Unknown                    |
| CANADA GEESE                    | Mature Forest<br>Wetlands      | Nest and Brood Habitat                      | First two<br>then 3 - 5 years | Unknown                    |
| WOODPECKERS                     | Snags                          | Nesting habitat                             | 3 - 5 years                   | Moderate                   |
| COMMON MERGANSER                | Riparian Snags                 | Nesting habitat<br>Availability of coho fry | 3 - 5 years                   | Moderate                   |
| PINK SALMON                     | Streams                        | Spawning Habitat                            | Annually                      | High                       |
| COHO SALMON                     | Streams                        | Rearing Habitat<br>Sport Fishing            | Annually                      | Moderate                   |
| CUTTHROAT TROUT                 | Streams<br>Lakes               | Rearing Habitat<br>Sport Fishing            | Annually                      | Low                        |

|                         |  |
|-------------------------|--|
| SITKA BLACK-TAILED DEER | <ol style="list-style-type: none"> <li>1) Cooperate with ADF&amp;G on spring composition (Adult:fawn ratios) flights</li> <li>2) Cooperate with ADF&amp;G on existing pellet group transects and hunter use surveys</li> <li>3) Coordinate with ADF&amp;G to add additional pellet group transects on South Montague to reflect population response to timber harvesting. A description of the techniques can be found in the ADF&amp;G report "Deer pellet-group surveys in Southeast Alaska; 1981 - 1987" by M.D. Kirchhoff and K.W. Pitcher.</li> </ol>   |
| BALD EAGLE              | <ol style="list-style-type: none"> <li>1) Cooperate with USFWS to conduct nesting and hatching censuses once every two-three years. Monitoring frequency may be reduced if initial results show no significant change.               <ol style="list-style-type: none"> <li>a) Fly coastline, or portions of the coastlines, to locate nests and determine which are active in May.</li> <li>b) Fly hatching success census in mid-July.</li> </ol> </li> <li>3) Monitor selected active nests within the project areas to determine hatching success.</li> <li>4) Monitor compliance with standards and guidelines that protect nest trees and associated habitat.</li> </ol> |
| BROWN BEAR              | <ol style="list-style-type: none"> <li>1) Cooperate with ADF&amp;G on the spring den emergence survey.</li> <li>2) Cooperate with ADF&amp;G on hunter use surveys</li> <li>3) Cooperate with ADF&amp;G to develop the methodology to survey the general public on bear-human incidents.</li> <li>4) Monitor any change in "defense of life and property" situations with brown bears.</li> <li>5) Monitor compliance of standards and guidelines for human facilities.</li> <li>6) Determine the feasibility of initiating a road scat census.</li> </ol>  |
| MONTAGUE VOLE           | <ol style="list-style-type: none"> <li>1) Monitor habitats identified through inventories.</li> <li>2) Develop population trend sampling scheme if inventories indicate the need.</li> </ol>   |
| CANADA GEESE            | <ol style="list-style-type: none"> <li>1) Monitor compliance with standards and guidelines near waterfowl use areas.</li> <li>2) Determine the disturbance radius around activity sites. Monitoring frequency will be reduced to every 3 - 5 years once the disturbance radius is determined.</li> </ol>   |

| MANAGEMENT<br>INDICATOR SPECIES | MONITORING PLAN  |
|---------------------------------|--|
| WOODPECKERS                     | <ol style="list-style-type: none"> <li>1) Monitor compliance with standard and guidelines for protecting snags.</li> <li>2) Monitor continued availability of snags in harvested areas</li> </ol>  |
| COMMON Merganser                | <ol style="list-style-type: none"> <li>1) Monitor compliance with snag guidelines in riparian areas</li> <li>2) Monitor food source and stream quality (See Coho monitoring plan).</li> </ol>  |
| PINK SALMON                     | <ol style="list-style-type: none"> <li>1) Monitor development activities to verify compliance with standards and guidelines to protect riparian habitat.</li> <li>2) Utilize ADP&amp;G aerial escapement surveys to monitor population trends in index streams.</li> <li>3) Conduct on-the-ground escapement surveys to monitor production at representative fish enhancement project sites.</li> <li>4) Conduct preemergent fry studies at selected sites.</li> </ol> |
| COHO SALMON                     | <ol style="list-style-type: none"> <li>1) Monitor development activities to verify compliance with standards and guidelines to protect riparian habitat.</li> <li>2) Conduct mark/recapture population estimates of coho fry in selected stream reaches.</li> <li>3) Monitor Catch Per Unit Effort for recreational cabin users.</li> </ol>  |
| CUTTHROAT TROUT                 | <ol style="list-style-type: none"> <li>1) Monitor development activities to verify compliance with standards and guidelines to protect riparian habitat.</li> <li>2) Monitor Catch Per Unit Effort for recreational cabin users.</li> </ol>  |



## MONITORING PLAN FOR SITKA BLACK-TAILED DEER ON MONTAGUE ISLAND

### Introduction:

Techniques have been developed in Southeast Alaska for monitoring population trends through pellet-group transect counts. In 1988, the Alaska Department of Fish and Game initiated a similar transect procedure on the three big islands in Prince William Sound. Spring composition flights (aerial censusing of the beach areas to determine the fawn to adult ratio) were also initiated in 1988. Hunter questionnaires are requested every two to three years. These projects will provide valuable population trend information, however, additional information will be needed to provide a reliable trend pattern on south Montague Island where timber harvesting activities are planned.

### Monitoring methods:

The Forest Service will cooperate with ADF&G to establish additional pellet-group transects on the south portion of Montague Island. These transects will represent habitats in close proximity to harvested areas, and habitats that are not associated with proposed actions. A detailed description of the pellet-group transect methods can be found in the ADF&G report "Deer pellet-group surveys in Southeast Alaska. 1981 - 1987" by M.D. Kirchhoff and K.W. Pitcher. This report describes the assumptions used in pellet-group transects and the advantages of various changes in sampling designs. The following paragraph describes the preferred monitoring procedure and then describes an alternative if the level of funding is not adequate.

Eight sampling areas will be located on the southern portion of Montague Island. Four of these will be on, or adjacent to, areas that will be impacted by the proposed actions, and four will be in areas that will not be effected. These eight sampling areas will be divided into two groups that will be monitored in alternating years. Two control areas and two 'impacted' areas will be monitored each year. This alternating pattern is described in the ADF&G report as eliminating some of the sampling error that occurs on annual counts. Each sampling area will have three permanent transects; six people could complete one area in one day.

Estimated cost: \$4000.00 to complete four sampling areas semi-annually.

### Additional studies:

In addition to cooperating with ADF&G on the pellet-group transects, the Forest Service will initiate a study to monitor the snow depth on Montague Island. This information can be used in conjunction with the pellet transect information to validate the Prince William Sound deer model and estimate winter severity. Snow depth markers will be placed in areas that can be seen from the air and can be accessed from the ground during the winter. Adjacent forested habitats will be surveyed on foot and a correlation developed with the snow depth represented by the marker in open areas.

## SUMMARY:

### Monitoring methods:

- 1) Monitor compliance with standards and guidelines as part of timber sales administration.
- 2) Cooperate with ADF&G spring composition census and deer hunter surveys.
- 3) Cooperate with ADF&G on existing pellet group transects
- 4) Coordinate with ADF&G to add additional transects on South Montague.
- 5) Initiate snow depth study.

### Monitoring frequency:

All facets of the monitoring plan will be completed annually except for monitoring pellet group transects which will be conducted every second year.

Estimated cost: \$4,000.00 semi-annually for pellet-group transects. \$6,000.00 for hunter survey ever third to fifth year.

## MONITORING PLAN FOR BALD EAGLES ON MONTAGUE ISLAND:

### Introduction:

The USFWS has conducted 5 censuses to locate eagle nests on Montague Island since 1974. Both aerial census techniques and a boat census have been used although the aerial censuses are considered to be more accurate. All of the known nests have been found within a half mile of the coast. The USFWS generally fly two aerial surveys to cover an area for eagles. The first survey is done in May. All nests are located and determined to be active or inactive and all eagles are counted. A second survey of all active nests is flown in July. This survey determines which nests are still active (and therefore, successful) and hatchlings are counted if possible. The Forest Service will cooperate with the USFWS to establish regular surveys of eagles on Montague Island.

### Monitoring methods:

- 1) Cooperate with USFWS to fly both censuses on a 2 - 3 year schedule.
- 2) FS personnel will determine the hatching success of selected nests near activity areas each year.
- 3) The Forest Service will monitor compliance with the 100 meter (330 feet) protection zone around nest trees and with other guidelines.

### Monitoring frequency:

Monitoring frequency may be reduced if initial results show no

significant change in the population.

Estimated cost:

\$4,000.00 every 2 - 3 years in cooperation with USFWS; \$1000.00 for on-site personnel to monitor hatching success near activity areas.

MONITORING PLAN FOR THE MONTAGUE ISLAND TUNDRA VOLE:

Introduction:

The Montague Island Tundra vole is believed to be a distinct subspecies of Microtus oeconomus, originally identified in 1906. Very little is known about the Montague vole, including its true distinction as a subspecies. The U.S. Fish and Wildlife Service lists the vole as a Category 2 species which indicates that there is concern for the longterm viability of the subspecies, but not enough information to list it as Threatened. In 1987 the U.S. Forest Service initiated a survey to identify habitats, and to obtain a genetics classification of the subspecies. Areas in Patton Bay, San Juan Bay and Port Chalmers were surveyed. Attempts were made to continue the survey in 1988; however, funding limited the extent of the survey. The limited results obtained indicate that the voles inhabit the 'new beach' areas and the 'dry muskegs' at low elevations. No signs of voles were observed in timbered areas. The Standards and Guidelines for the management area identify the need for a continued inventory of habitats to identify areas used by the voles.

Monitoring methods:

- 1) The baseline inventory data will be used to identify habitats and their distribution. This information will be assessed to determine the need to monitor for relative abundance.
- 2) If the need for monitoring is identified, population trends for the voles will be established using mark and recapture techniques. Recognition of the cyclic pattern of microtine populations (2 - 5 years) will influence the duration of monitoring.

Costs: Will be determined after the inventory stage is completed and the extent of sampling is known.



## MONITORING PLAN FOR BROWN BEARS ON MONTAGUE ISLAND:

### Introduction:

The population density of brown bears on Montague Island has been low since the earthquake of 1964 altered the availability of salmon on the island. Obtaining actual population density information is difficult; however, ADF&G has begun a spring den emergence survey that provides a rough index of the population. This survey is flown during the peak of den emergence, the number of tracks observed around the den and the number of dens provides population trend information. ADF&G has included questions concerning bear sightings and confrontations on the deer hunter survey. ADF&G also records of the number of successful hunters and the number of bears destroyed in defense of life and property. These records supply additional information that can be used in assessing the status of the bear population in Prince William Sound.

### Monitoring methods:

- 1) Cooperate with ADF&G on the hunter use surveys.
- 2) Cooperate with ADF&G on the den emergence census.
- 3) Cooperate with ADF&G to develop methods to document human-bear incidents with the general public.
  - a) This may be as simple as requesting that cabin users record observations and incidents in a log book.
  - b) A more costly and complicated approach would be a public survey.
- 4) Monitor any trends or changes in "Defense of life and property killings".
- 5) Monitor compliance with standards and guidelines with emphasis on facilities and on areas that receive seasonal high use by bears.
- 6) Consider a periodic (early and late summer) scat census along the road which may also supplement the den emergence census.

### Estimated cost:

Minimal cost associated with this monitoring because the information is currently being gathered by ADF&G and/or will require limited time from FS personnel.

## MONITORING PLAN FOR WOODPECKERS ON MONTAGUE ISLAND:

### Introduction:

Woodpeckers rely on dead and dying trees for nesting cavities and for their food sources. Timber harvesting can reduce woodpecker habitat if precautions are not taken to protect the trees that they depend on. The Forest Service recognizes this dependance and has made a nation-wide effort to ensure the availability of snags to cavity nesting birds. The Forest Service has specific guidelines to ensure that snags and dying trees are left standing throughout harvested areas. Several species of woodpeckers are considered uncommon or rare in the Prince William Sound; however, the blackbacked three-toed woodpecker is a casual resident during the winter months. The low density of woodpeckers in the area make direct population monitoring impractical; however, the habitat can be monitored to ensure availability.

### Monitoring methods:

- 1) Monitor compliance with the standards and guidelines for protecting snags and some dying trees.
- 2) Conduct random "spot checks" to assess the continued availability and use of snags in harvested areas. These checks will evaluate the number of snags available in harvested areas in 3 - 5 year intervals after harvesting.

### Estimated cost:

\$500.00 during harvesting (to support extra time that the Timber Sales Administer may spend monitoring compliance with guidelines).

Costs for the post-harvest evaluation should be minimal by combining this with other activities in the area.

## MONITORING PLAN FOR CANADA GEESE ON MONTAGUE ISLAND:

### Introduction:

The "Prince William Sound" Canada geese population was selected as a management indicator species to monitor the effects of management activities on wetland areas and associated mature forest. There is little available information on geese in Prince William Sound. A genetics study to determine which subspecies the geese belong to is currently underway. The results are expected during the spring of 1989. Known behavior suggests similarities to the Vancouver Canada geese population of Southeastern Alaska. Therefore, the habitat capability model used for the Vancouver geese has been used for general information on habitat requirements. Because of the low density and lack of specific knowledge about the Prince William Sound population, several standard techniques used for assessing goose populations are inappropriate for Montague Island; therefore, monitoring efforts will focus on standards and guidelines monitoring in important habitats.

In order to address the potential for impacts on the population caused by management actions, the Forest Service will monitor the disturbance levels in habitat adjacent to the proposed activity sites. This will allow for validation of the 100 - 200 meter disturbance zone that is described for Vancouver Canada Geese.

### Monitoring methods:

- 1) Monitor compliance with the standards and guidelines for activities near goose and other waterfowl habitats.
- 2) In conjunction with the survey and design for the road on south Montague Island, 30 transects, 2 meters by 400 meters will be placed in goose habitats. The transects will be placed in groups of 3 or 4 and will lie perpendicular to the proposed road. Observers will walk from a permanently marked starting point along a given compass bearing. Records of goose use within one meter on either side of the observer will be documented. The type of use (nests, grazing sign, scat, feathers) will be recorded with the distance along the 400 meter transect line. Observations of geese will be recorded as on or off of the transect line with an approximate distance recorded when possible.
  - a) Analysis of this data can include chi square tests, t-tests or an analysis of variance for presence and absence. The distance that the use signs occur from the road will validate the disturbance zone caused from the road, and will indicate the actual protection buffer needed to cause no impact to the geese.

### Monitoring frequency:

Sampling should begin at least one year prior to road construction (suggest initial transects be set up during road lay-out or surveying). Once the disturbance radius is determined the frequency can be decreased to every 3 - 5 years.



Estimated costs: \$2,000.00 per sampling year.

## MONITORING PLAN FOR COMMON MERGANSERS ON MONTAGUE ISLAND:

### Introduction:

Common mergansers use the snags that are associated with riverine systems for nesting sites. The adults and ducklings both rely on juvenile salmon for their primary food source and require clear water in order to pursue and capture their prey. The Forest Service selected the common merganser as an indicator of the effects of management actions on riverine systems and associated mature forest habitats. This monitoring plan focuses on the brood rearing period of mergansers on the river systems within or near proposed activity sites. Merganser broods rely on the river channels for escape until they can be concealed in dense emergent vegetation. Brood counts are often used as a population index; however, the low density of the population on Montague Island make direct population monitoring impractical. Therefore, monitoring efforts will focus on compliance with the standards and guidelines, and on important habitat characteristics.

### Monitoring methods:

- 1) Monitor the stability of the Coho salmon juvenile population (See coho monitoring plan).
- 2) Monitor compliance with standards and guidelines protecting snags in riparian areas.
- 3) Monitor the continued availability of nesting trees through periodic checks of harvested areas adjacent to riparian zones.

### Justification:

Management area standards and guidelines for timber harvest in riparian areas gives special consideration to a minimum of 100 foot area on each side of the stream. Snag guidelines specify that at least 3 snags per acre are retained in riparian areas. Ensuring the availability of nesting habitat and coho juveniles should provide the necessary components to maintain the merganser population.

### Estimated Cost:

\$1000.00 for the additional time the Timber Sales Administrator may spend assuring the guidelines are met. Other information will be obtained in conjunction with monitoring for coho salmon.

## MONITORING PLAN FOR PINK SALMON ON MONTAGUE ISLAND

### Introduction:

A primary objective of management activities within the Big Islands Management Area is to maintain or improve the habitat capability for pink salmon. This is closely related to the quality and quantity of the available spawning areas.

Monitoring will insure that proposed land disturbance activities do not adversely effect existing pink salmon spawning habitat. Monitoring will also verify increases in pink salmon habitat capability from the proposed fish habitat improvement projects.

### Monitoring Methods:

1. Riparian standards and guidelines have been developed to protect pink salmon spawning habitat within the project area. Monitoring resource development projects will verify that these standards and guidelines were met and that the Standards and Guidelines are sufficient to meet riparian objectives. This monitoring will consist of spot checks of timber harvest units, road crossing structures, and other land disturbing activities. It may also include intensive pre and post activity surveys, depending on the potential for adverse impacts.
2. ADF&G has conducted aerial escapement surveys for pink salmon on 33 index streams on Montague Island since approximately 1966. These surveys, and the associated commercial harvest data provide a relative index of size of the pink salmon populations along the north and west sides of Montague Island. Unfortunately, ADF&G does not survey the south end of the island or the streams along the outside coast.

ADF&G aerial escapement surveys will be used to identify general population trends for pink salmon on Montague Island. The surveys will also be used to identify specific population trends for index streams which have the potential to be effected by management activities. These streams include: Point Creek (17020), Clam Beach Creek (17030), MacLeod Creek (17070), and Chalmers River (17410). This monitoring technique will not be effective for the majority of streams within the south Montague project area because these streams are not surveyed by ADF&G.

3. On-the-ground adult escapement surveys will be conducted at representative pink salmon habitat enhancement projects to verify increased production estimates and to identify necessary project design modifications, if any. Survey intensity and duration will be sufficient to verify project benefits and to establish an average expected project life.

4. ADF&G has conducted preemergent fry sampling on numerous streams throughout Prince William Sound annually since approximately 1980 to get an estimate of pink salmon egg-to-fry survival and an index of potential adult production. Four of these index streams are located on the north end of the Montague Island. Unfortunately, none of the streams are in areas which might be effected by proposed management activities.

ADF&G preemergent fry studies at the four established sites on Montegue Island will be used to establish general egg-to-fry survival estimates and population indices for the project area. Up to three additional preemergent fry sampling sites will be established in drainages with reasonable chances of potential impacts to identify specific project related changes, if any. Additional sample sites will also be developed in representative spawning habitat improvement projects to verify production estimates. Assuming that similiar techniques are used at both the established ADF&G sites and the new preemergent fry sample sites, the survival indices from the additional sites should be correllated to the established sites so that fluctuations caused by natural events such as floods, droughts, or hard freezes can be seperated from human related impacts.

Estimated Costs:

Compliance with Riparian Standards and Guidelines - \$1,000 / year\*  
Monitor ADF&G escapement surveys - \$100 / year  
On-the-ground escapement surveys - \*\*  
Preemergent fry studies - \$1,500 / year\*\*\*

\* Cost will depend on the Alternative selected.

\*\* Costs will depend on the number and type of enhancement projects implemented.

\*\*\* Costs for this portion will increase depending on the number and type of enhancement projects implemented.



## MONITORING PLAN FOR COHO SALMON ON MONTAGUE ISLAND

### Introduction:

A primary objective of management activities within the Big Islands Management Area is to maintain or improve the habitat capability for coho salmon. This is closely related to the quality and quantity of juvenile rearing areas.

Monitoring will insure that proposed land disturbance activities do not adversely effect existing coho salmon rearing habitat. Monitoring will also verify increases in coho salmon habitat capability from the proposed fish habitat improvement projects.

### Monitoring methods:

1. Riparian standards and guidelines have been developed to protect coho rearing habitat within the project area. Monitoring resource development projects will verify that these standards and guidelines were met and that the Standards and Guidelines are sufficient to meet riparian objectives. This monitoring will consist of spot checks of timber harvest units, road crossing structures, and other land disturbance activities. It may also include intensive pre and post activity surveys, depending on the potential for adverse impacts.
2. Mark/recapture population estimates for coho fry will be conducted on up to three selected stream reaches which have the greatest potential for impacts from resource development projects to verify that riparian standards and guidelines are sufficient to meet riparian objectives. At least two, and preferably three mark/recapture estimates taken during the same period in different years should be completed prior to project implementation to provide a pre-project baseline. The number and duration of post project population estimates will depend on the perceived level of impact and the sampling results.

Mark/recapture estimates will also be completed on representative coho habitat enhancement projects to verify increased production estimates and to identify necessary project design changes, if any.

3. USFS recreational cabin users will be requested to submit Catch-Per-Unit-Effort information for coho to identify gross population trends. This information will be provided to the ADF&G for their use in developing appropriate harvest strategies to maintain high recreational values.

### Estimated Cost:

Compliance with Riparian Standards and Guidelines - \$1,000 / year\*  
Mark/Recapture Population Estimates - \$1,500 / year\*\*\*  
Monitor CPUE for Recreational Cabin Users- \$300 / year

\* Cost will depend on the Alternative selected.

\*\*\* Costs for this portion will increase depending on the number and type of enhancement projects implemented.

## MONITORING PLAN FOR CUTTHROAT TROUT ON MONTAGUE ISLAND

### Introduction:

Little is known about the distribution or population characteristics of cutthroat trout on Montague Island. Monitoring will insure that proposed land disturbance activities do not adversely effect existing cutthroat spawning or rearing habitat.

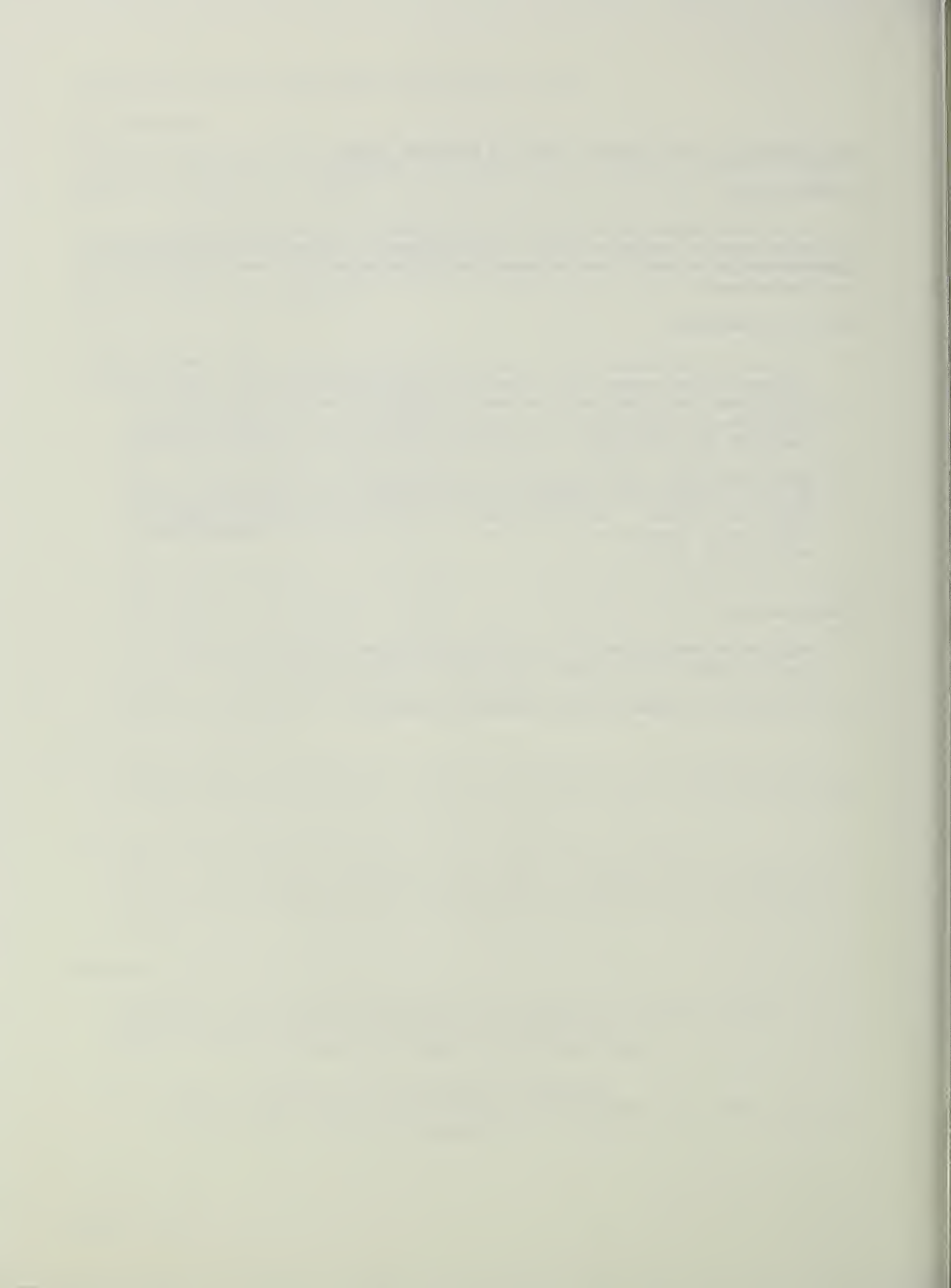
### Monitoring methods:

1. Cutthroat trout habitat will be identified during project level design and implementation surveys. Spot checks of timber harvest units, road crossing structures, and other land disturbance activities will verify that standards and guidelines to protect fish habitat were met and that the Standards and Guidelines were sufficient to meet the riparian objectives.
2. USFS recreational cabin users will be requested to submit Catch-Per-Unit-Effort information for cutthroat trout to identify gross population trends. This information will be provided to the ADF&G for their use in developing appropriate harvest strategies to maintain high recreational values.

### Estimated Cost:

Compliance with Riparian Standards and Guidelines - \$1,000 / year\*  
Monitor CPUE of Recreational Cabin Users - \$200 / year

\* Cost will depend on the Alternative selected





## **Appendix D**

# **Transportation Planning Report**



## INTRODUCTION

A transportation plan has been established for the Big Islands Management Area in response to concerns by appellants to the Chugach National Forest Land and Resource Management Plan. The appeal settlement agreement states:

"Transportation Planning - Reasonable alternative transportation systems (e.g., roads, trails, log transfer facilities) will be addressed, including effects on resources. Specific transportation facility locations attributable to individual projects will be addressed in individual project NEPA documents tiered to the MAA and the Plan."

A transportation plan prescribes the feasibility to establish a network of access opportunities. This is done by identifying all the resources which may need to be transported within the study area.. Once identified, a network of feasible route corridors can be created and studied. Alternatives of an environmental statement are analyzed through this network and specific actions are proposed for implementation.

This transportation plan covers all of the Big Island Management Area. Since the MAA is to disclose the environmental effects of the actions proposed by the Forest Plan as amended by the Settlement Agreement, the transportation plan looks at proposals specifically on southern Montague Island. Until there is direction which prescribes active management of resources of Green, Hinchinbrook and Hawkins Islands there will be no road or log transfer facilities proposed.

Transportation planning for the Big Islands MAA identifies specific road corridors and Log Transfer Facility sites. The broad field of access management includes trails, boat ramps and air and water access points. The location of trails, boat ramps and air and water access points are inseparably associated with recreation management on the Chugach National Forest and were best analyzed with the recreation proposed projects.

The Big Islands MA Transportation Plan also incorporates a request from Chugach Alaska Corporation (CAC) for roaded access across southern Montague Island from the land they own and are actively managing around Patton Bay to MacLeod Harbor, another parcel which CAC is actively managing.



## ISLAND FEASIBILITY SYSTEM

### Management Area Wide

The transportation plan is based on the need to establish a network to move resources on an island to points of departure from an island. Once established, a network will be used to look at commodity and personnel movement on routes without leaving the island.

The resources potentially requiring some level of access were timber, minerals and recreation developments. Each was specifically identified during the environmental analysis process. No other resources required a connection to a network of transportation facilities.

Individual timber stands were identified for the suitable timber base.

A mineral survey did not identify any mineral deposits for which we would expect any development on the island at this time.

There has been some recreation projects identified on Montague Island contributing to a transportation system.

Feasibility networks were not established for all the islands in the management area. Montague Island was the only one to require a transportation network. Hinchinbrook Island was designated PII (Primitive) by the settlement agreement and in doing so transportation systems were excluded from being developed on the island. Green Island is a proposed natural research area, an action not requiring a transportation system. Hawkins Island did not have any actions or resources which requires a transportation system be developed.

The entire management area is composed of individual islands. There are only two modes of access to each of the islands, air and water. For both aircraft and boat pilots, landing at the islands is at pilot discretion only. Hinchinbrook Island has one FAA approved site at Johnson Point, which is the only approved aircraft landing site in the Management Area.

### Montague Island

Investigating route corridors on an island 50 miles long and 4 to 12 miles wide by foot would take several field seasons. For this plan, a first hand look at the island's terrain was gained by direct observation from over-head aircraft, the Forest's aerial photograph library and topography maps to determine feasible road corridors. Ground inspections have been made for the LTF sites used in this MAA.

The network of feasible route corridors was able to reach all regions of the island. There were cases where limited areas were not identified as being accessed with a route corridor. This can not be interpreted as not having a feasible route corridor, only that at this time there was no reason to investigate the providing access to the area, i.e. no resources were designated.

There are feasible LTF sites at both north and south ends of Montague Island. There is a distinct lack of sites in the middle region of the island on both east and west shores.

Once identified, a route corridor was broken down into segments. The segments could then be attributed for analysis with specific costs. The table starting on the next page displays this information.

Each segment was classed by function, haul standard, and terrain type. The functional class, arterial, collector and local, provides the breakdown for the overall system and the type of service the route would provide. The haul standard based on lanes, alignment and surface, is the source for haul rate determination. The terrain type is used to determine construction cost.

Route construction cost includes work to establish a running surface and drainage structures less than 35 sq. ft. end area. Larger culverts, arch and multi-plate culverts and bridges were added to the construction as a specific separate item.

The existing trails on Montague are principally to move people around in a small local area or provide access through private ownership to public land. The existing trails are not used to travel extended distances throughout the island.

LTF construction cost establishes a pad and/or ramp to water the log bundles. No entry machines are included in the cost. Entry machinery will be brought in and taken out with each operator. Dumping and rafting costs associated with the log transfer site were also identified. A towing cost was also used. Towing log rafts was assumed to be to Seward, the closest major processing facility. The mill at Seward is under construction and is assumed to be in operation for this plan.

There are two modes of access to the Montague Island, air and water, from the mainland and surrounding communities.

Commercial and private pilots fly to and land at various points on the island using beaches and ridges at their own discretion. Float planes can land at Stump Lake on Montague Island or protected saltwater coves throughout the MA. Stump Lake is the only freshwater lake which is known to be large enough for air operations. Pilots must use their own discretion for any water landing due to rough water conditions on the saltwater and hazards such as submerged stumps and free floating debris in Stump Lake.

The Chugach National Forest does not manage landing facilities for the public use. Feasibility studies will be prepared involving both the transportation planning and recreation sections.

Boat pilots can refer to the Coastal Pilot Guide for direction on getting to the shores of Montague Island. In all cases, boat pilots should use their own discretion and approach the shore with caution. Montague Island, particularly the east coastline, receives debris from the ocean.

| Link | Road Class | ZGrade | Haul#<br>Ah/mbf | Haul#<br>Ek/mbf | Length<br>(miles) | Terrain<br>Type | Constr.<br>\$/mi | Bridge, LTF<br>Other \$ | Maint.<br>\$/mi | D/R<br>\$/mbf | Fixed<br>\$ | Vari.<br>\$-Ahd | Vari.<br>\$-Ek |
|------|------------|--------|-----------------|-----------------|-------------------|-----------------|------------------|-------------------------|-----------------|---------------|-------------|-----------------|----------------|
| 1    | 4A2        | 0      | 0.17            | 0.17            | 3.0               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 497,316     | 0.51            | 0.51           |
| 2    | 4A2        | 0      | 0.17            | 0.17            | 0.2               | 1:S16-20        | 165,507          | 150,000                 | 265             | 0.00          | 183,154     | 0.03            | 0.03           |
| 3    | 4A2        | 4      | 0.29            | 0.18            | 3.2               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 530,470     | 0.93            | 0.58           |
| 4    | 4A2        | 10     | 0.29            | 0.53            | 0.6               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 99,463      | 0.17            | 0.32           |
| 5    | 4A2        | 0      | 0.17            | 0.17            | 3.6               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 185,767     | 0.61            | 0.61           |
| 6    | 4A2        | 0      | 0.17            | 0.17            | 1.7               | 18:S16-20       | 152,936          | 0                       | 265             | 0.00          | 260,476     | 0.29            | 0.29           |
| 7    | 4A2        | 0      | 0.17            | 0.17            | 1.1               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 182,349     | 0.19            | 0.19           |
| 8    | 4A2        | 0      | 0.17            | 0.17            | 0.8               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 132,618     | 0.14            | 0.14           |
| 9    | 4A2        | 5      | 0.32            | 0.19            | 0.4               | 1:S16-20        | 165,507          | 97,000                  | 265             | 0.00          | 163,309     | 0.13            | 0.08           |
| 10   | 4A2        | 2      | 0.22            | 0.17            | 1.7               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 231,812     | 0.37            | 0.29           |
| 11   | 4A2        | 2      | 0.22            | 0.17            | 1.2               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 198,926     | 0.26            | 0.20           |
| 12   | 4A2        | 3      | 0.17            | 0.25            | 0.7               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 116,040     | 0.12            | 0.18           |
| 13   | 4A2        | 5      | 0.19            | 0.25            | 0.4               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 66,309      | 0.08            | 0.10           |
| 14   | 4A2        | 0      | 0.17            | 0.17            | 0.7               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 36,121      | 0.12            | 0.12           |
| 15   | 4A2        | 3      | 0.25            | 0.17            | 1.2               | 1A:S16-20       | 173,574          | 242,000                 | 265             | 0.00          | 450,607     | 0.30            | 0.20           |
| 16   | 4B2        | 4      | 0.29            | 0.18            | 1.8               | 18:S16-20       | 152,936          | 0                       | 265             | 0.00          | 275,798     | 0.52            | 0.32           |
| 17   | 4B2        | 4      | 0.18            | 0.29            | 1.3               | 11:S16-20       | 170,467          | 0                       | 265             | 0.00          | 221,952     | 0.23            | 0.38           |
| 18   | 4B2        | 4      | 0.18            | 0.29            | 0.7               | 18:S16-20       | 152,936          | 0                       | 265             | 0.00          | 107,255     | 0.13            | 0.20           |
| 19   | 4A2        | 0      | 0.17            | 0.17            | 0.7               | V:S16-20        | 51,337           | 97,000                  | 265             | 0.00          | 133,121     | 0.12            | 0.12           |
| 20   | 4A2        | 0      | 0.17            | 0.17            | 7.2               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 371,534     | 1.22            | 1.22           |
| 21   | 4A2        | 0      | 0.17            | 0.17            | 1.5               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 77,403      | 0.26            | 0.26           |
| 22   | 4A2        | 0      | 0.17            | 0.17            | 0.6               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 30,961      | 0.10            | 0.10           |
| 23   | 4A2        | 0      | 0.17            | 0.17            | 0.9               | V:S16-20        | 51,337           | 163,000                 | 265             | 0.00          | 209,442     | 0.15            | 0.15           |
| 24   | 4A2        | 0      | 0.17            | 0.17            | 3.1               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 159,966     | 0.53            | 0.53           |
| 25   | 4A2        | 0      | 0.17            | 0.17            | 1.7               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 87,723      | 0.29            | 0.29           |
| 26   | 4A2        | 0      | 0.17            | 0.17            | 0.8               | V:S16-20        | 51,337           | 150,000                 | 265             | 0.00          | 191,282     | 0.14            | 0.14           |
| 27   | 4A2        | 0      | 0.17            | 0.17            | 0.9               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 156,455     | 0.15            | 0.15           |
| 28   | 4A2        | 0      | 0.17            | 0.17            | 0.6               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 104,303     | 0.10            | 0.10           |
| 29   | 4A2        | 1      | 0.19            | 0.17            | 1.3               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 225,991     | 0.25            | 0.22           |
| 30   | 4A2        | 1      | 0.17            | 0.19            | 0.6               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 30,961      | 0.10            | 0.11           |
| 31   | 4A2        | 0      | 0.17            | 0.17            | 1.3               | V:S16-20        | 51,337           | 150,000                 | 265             | 0.00          | 217,083     | 0.22            | 0.22           |
| 32   | 4A2        | 0      | 0.17            | 0.17            | 0.4               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 20,641      | 0.07            | 0.07           |
| 33   | 4A2        | 0      | 0.17            | 0.17            | 1.5               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 77,403      | 0.26            | 0.26           |
| 34   | 4B2        | 2      | 0.24            | 0.20            | 0.9               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 156,455     | 0.22            | 0.18           |
| 35   | 4B2        | 0      | 0.20            | 0.20            | 0.9               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 156,455     | 0.18            | 0.18           |
| 36   | 4B2        | 1      | 0.20            | 0.21            | 0.7               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 121,587     | 0.14            | 0.15           |
| 37   | 4B2        | 0      | 0.20            | 0.20            | 0.7               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 121,687     | 0.14            | 0.14           |
| 38   | 4B2        | 2      | 0.20            | 0.24            | 1.0               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 173,839     | 0.20            | 0.24           |
| 39   | 4B2        | 0      | 0.20            | 0.20            | 1.2               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 61,922      | 0.24            | 0.24           |
| 40   | 4B2        | 0      | 0.20            | 0.20            | 1.3               | V:S16-20        | 51,337           | 0                       | 265             | 0.00          | 77,403      | 0.30            | 0.30           |
| 41   | 4B2        | 0      | 0.20            | 0.20            | 0.2               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 34,768      | 0.04            | 0.04           |
| 42   | 4B2        | 2      | 0.24            | 0.20            | 1.0               | 18:S16-20       | 152,936          | 0                       | 265             | 0.00          | 153,221     | 0.24            | 0.20           |
| 43   | 4B2        | 4      | 0.30            | 0.20            | 0.5               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 86,920      | 0.15            | 0.10           |
| 44   | 4B2        | 0      | 0.20            | 0.20            | 0.3               | 1A:S16-20       | 173,574          | 0                       | 265             | 0.00          | 52,152      | 0.06            | 0.06           |
| 45   | 4B2        | 0      | 0.20            | 0.20            | 0.6               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 99,463      | 0.12            | 0.12           |
| 46   | 4B2        | 0      | 0.20            | 0.20            | 1.0               | 1:S16-20        | 165,507          | 0                       | 265             | 0.00          | 165,772     | 0.20            | 0.20           |



|     |     |    |      |      |     |           |         |   |     |      |         |      |      |
|-----|-----|----|------|------|-----|-----------|---------|---|-----|------|---------|------|------|
| 47  | 4B2 | 2  | 0.20 | 0.24 | 0.2 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 91,933  | 0.12 | 0.14 |
| 48  | 4B2 | 1  | 0.20 | 0.21 | 1.0 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 153,221 | 0.20 | 0.21 |
| 49  | 4B2 | 0  | 0.20 | 0.20 | 2.0 | 18:S16-20 | 51,337  | 0 | 265 | 0.00 | 103,204 | 0.40 | 0.40 |
| 50  | 4B2 | 2  | 0.24 | 0.20 | 1.9 | 18:S16-20 | 51,337  | 0 | 265 | 0.00 | 98,044  | 0.46 | 0.38 |
| 51  | 4B2 | 0  | 0.20 | 0.20 | 1.5 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 248,658 | 0.30 | 0.30 |
| 52  | 4B2 | 0  | 0.24 | 0.24 | 1.1 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 168,543 | 0.26 | 0.26 |
| 53  | 4C2 | 0  | 0.24 | 0.24 | 1.0 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 153,221 | 0.24 | 0.24 |
| 54  | 4C2 | 2  | 0.24 | 0.26 | 0.6 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 91,933  | 0.14 | 0.16 |
| 55  | 4B2 | 0  | 0.20 | 0.20 | 1.6 | 18:S16-20 | 51,337  | 0 | 265 | 0.00 | 82,563  | 0.32 | 0.32 |
| 56  | 4B2 | 2  | 0.24 | 0.20 | 0.4 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 61,288  | 0.10 | 0.08 |
| 57  | 4B2 | 0  | 0.20 | 0.20 | 0.9 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 149,195 | 0.18 | 0.18 |
| 58  | 4B2 | 0  | 0.20 | 0.20 | 0.7 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 116,040 | 0.14 | 0.14 |
| 59  | 4B2 | 0  | 0.20 | 0.20 | 0.8 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 122,577 | 0.16 | 0.16 |
| 60  | 4B2 | 0  | 0.20 | 0.20 | 0.6 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 91,933  | 0.12 | 0.12 |
| 61  | 4B2 | 0  | 0.20 | 0.20 | 0.6 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 91,933  | 0.12 | 0.12 |
| 62  | 4B2 | 0  | 0.20 | 0.20 | 1.0 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 153,221 | 0.20 | 0.20 |
| 63  | 4C2 | 0  | 0.24 | 0.24 | 1.1 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 168,543 | 0.26 | 0.06 |
| 64  | 4C2 | 0  | 0.24 | 0.24 | 0.7 | 18:S16-20 | 170,467 | 0 | 265 | 0.00 | 119,512 | 0.17 | 0.06 |
| 65  | 4B2 | 0  | 0.20 | 0.20 | 1.5 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 248,658 | 0.30 | 0.30 |
| 66  | 4B2 | 0  | 0.20 | 0.20 | 0.6 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 99,463  | 0.12 | 0.12 |
| 67  | 4B2 | 0  | 0.24 | 0.24 | 0.3 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 45,966  | 0.07 | 0.07 |
| 68  | 4C2 | 0  | 0.24 | 0.24 | 0.5 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 76,611  | 0.12 | 0.12 |
| 69  | 4C2 | 0  | 0.24 | 0.24 | 0.3 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 45,966  | 0.07 | 0.07 |
| 70  | 4B2 | 0  | 0.20 | 0.20 | 0.8 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 132,618 | 0.16 | 0.16 |
| 71  | 4B2 | 0  | 0.20 | 0.20 | 0.6 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 99,463  | 0.12 | 0.12 |
| 72  | 4B2 | 0  | 0.20 | 0.20 | 0.4 | 18:S16-20 | 170,467 | 0 | 265 | 0.00 | 68,293  | 0.08 | 0.08 |
| 73  | 4B2 | 0  | 0.20 | 0.20 | 0.6 | 18:S16-20 | 170,467 | 0 | 265 | 0.00 | 102,439 | 0.12 | 0.12 |
| 74  | 4B2 | 0  | 0.20 | 0.20 | 0.4 | 18:S16-20 | 170,467 | 0 | 265 | 0.00 | 68,293  | 0.08 | 0.08 |
| 75  | 4B2 | 0  | 0.20 | 0.20 | 1.0 | 18:S16-20 | 170,467 | 0 | 265 | 0.00 | 170,732 | 0.20 | 0.20 |
| 76  | 4B2 | 0  | 0.20 | 0.20 | 0.5 | 18:S16-20 | 170,467 | 0 | 265 | 0.00 | 85,366  | 0.10 | 0.10 |
| 77  | 4C2 | 0  | 0.24 | 0.24 | 0.7 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 107,255 | 0.17 | 0.17 |
| 78  | 4C2 | 0  | 0.24 | 0.24 | 0.8 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 122,577 | 0.19 | 0.19 |
| 79  | 4C2 | 0  | 0.24 | 0.24 | 0.4 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 66,309  | 0.10 | 0.10 |
| 80  | 4C2 | 4  | 0.24 | 0.32 | 1.4 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 232,081 | 0.34 | 0.45 |
| 81  | 4C2 | 4  | 0.32 | 0.24 | 1.6 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 265,235 | 0.51 | 0.38 |
| 82  | 4B2 | 2  | 0.24 | 0.20 | 1.8 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 275,798 | 0.43 | 0.34 |
| 83  | 4C2 | 2  | 0.26 | 0.24 | 1.7 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 281,812 | 0.44 | 0.41 |
| 84  | 4C2 | 3  | 0.29 | 0.24 | 1.8 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 298,390 | 0.52 | 0.43 |
| 85  | 4C2 | 0  | 0.24 | 0.24 | 0.4 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 66,309  | 0.10 | 0.10 |
| 86  | 4C2 | 0  | 0.24 | 0.24 | 1.6 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 265,235 | 0.38 | 0.38 |
| 87  | 4C2 | 0  | 0.24 | 0.24 | 0.8 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 122,577 | 0.19 | 0.19 |
| 88  | 4C2 | 0  | 0.24 | 0.24 | 0.5 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 76,611  | 0.12 | 0.12 |
| 89  | 4C2 | 0  | 0.24 | 0.24 | 1.1 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 168,543 | 0.26 | 0.26 |
| 90  | 4C2 | 0  | 0.24 | 0.24 | 0.8 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 122,577 | 0.19 | 0.19 |
| 91  | 4C2 | 0  | 0.24 | 0.24 | 0.5 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 82,886  | 0.12 | 0.12 |
| 92  | 4C2 | 0  | 0.24 | 0.24 | 0.4 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 66,309  | 0.10 | 0.10 |
| 93  | 4C2 | 0  | 0.24 | 0.24 | 0.6 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 91,933  | 0.14 | 0.14 |
| 94  | 4C2 | 2  | 0.26 | 0.24 | 1.0 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 165,772 | 0.26 | 0.24 |
| 95  | 4C2 | 2  | 0.26 | 0.24 | 0.5 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 76,611  | 0.13 | 0.12 |
| 96  | 4C2 | 4  | 0.32 | 0.24 | 0.5 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 76,611  | 0.16 | 0.12 |
| 97  | 4C2 | 3  | 0.24 | 0.29 | 2.3 | 18:S16-20 | 65,507  | 0 | 265 | 0.00 | 151,276 | 0.55 | 0.67 |
| 98  | 4B2 | 4  | 0.20 | 0.30 | 0.5 | 18:S16-20 | 165,507 | 0 | 265 | 0.00 | 82,886  | 0.10 | 0.15 |
| 99  | 4B2 | 10 | 0.29 | 0.53 | 1.0 | 18:S16-20 | 152,956 | 0 | 265 | 0.00 | 153,221 | 0.29 | 0.53 |
| 100 | 4A2 | 0  | 0.17 | 0.17 | 2.0 | 18:S16-20 | 51,337  | 0 | 265 | 0.00 | 103,204 | 0.34 | 0.34 |
| 101 | 4A2 | 0  | 0.17 | 0.17 | 2.6 | 18:S16-20 | 51,337  | 0 | 265 | 0.00 | 134,165 | 0.44 | 0.44 |

|     |     |    |      |      |       |           |         |         |     |      |         |       |       |
|-----|-----|----|------|------|-------|-----------|---------|---------|-----|------|---------|-------|-------|
| 102 | 4A2 | 0  | 0.17 | 0.17 | 0.8   | U:S16-20  | 51,337  | 0       | 265 | 0.00 | 41,282  | 0.14  | 0.14  |
| 103 | 4A2 | 0  | 0.17 | 0.17 | 2.1   | U:S16-20  | 51,337  | 0       | 265 | 0.00 | 108,364 | 0.36  | 0.36  |
| 104 | 4A2 | 0  | 0.17 | 0.17 | 3.0   | U:S16-20  | 51,337  | 0       | 265 | 0.00 | 154,926 | 0.51  | 0.51  |
| 105 | 4A2 | 0  | 0.17 | 0.17 | 1.3   | U:S16-20  | 51,337  | 0       | 265 | 0.00 | 67,083  | 0.22  | 0.22  |
| 106 | 4A2 | 0  | 0.17 | 0.17 | 2.1   | U:S16-20  | 51,337  | 0       | 265 | 0.00 | 108,364 | 0.36  | 0.36  |
| 107 | 4A2 | 0  | 0.17 | 0.17 | 3.0   | U:S16-20  | 51,337  | 0       | 265 | 0.00 | 154,806 | 0.51  | 0.51  |
| 108 | 4A2 | 0  | 0.17 | 0.17 | 2.0   | U:S16-20  | 51,337  | 0       | 265 | 0.00 | 103,204 | 0.34  | 0.34  |
| 109 | 4A2 | 0  | 0.17 | 0.17 | 2.5   | U:S16-20  | 51,337  | 0       | 265 | 0.00 | 129,005 | 0.43  | 0.43  |
| 110 | 4A2 | 0  | 0.17 | 0.17 | 0.5   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 68,253  | 0.09  | 0.09  |
| 111 | 4A2 | 2  | 0.17 | 0.22 | 1.6   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 218,410 | 0.27  | 0.35  |
| 112 | 4C2 | 0  | 0.24 | 0.24 | 0.7   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 104,214 | 0.17  | 0.17  |
| 113 | 4B2 | 4  | 0.20 | 0.30 | 1.0   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 136,506 | 0.20  | 0.30  |
| 114 | 4D2 | 5  | 0.28 | 0.38 | 0.4   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 39,351  | 0.11  | 0.15  |
| 115 | 4A2 | 0  | 0.17 | 0.17 | 1.3   | IA:S14-10 | 158,120 | 0       | 265 | 0.00 | 205,901 | 0.22  | 0.22  |
| 117 | 4B2 | 2  | 0.20 | 0.24 | 3.7   | U:S14-10  | 37,249  | 0       | 265 | 0.00 | 138,302 | 0.74  | 0.89  |
| 118 | 4C2 | 0  | 0.24 | 0.24 | 2.5   | U:S14-10  | 37,249  | 0       | 265 | 0.00 | 93,785  | 0.60  | 0.60  |
| 119 | LTF | 0  | 0.00 | 0.00 | 0.1   | 0         | 305,989 | 0       | 0   | 0.00 | 305,989 | 0.00  | 0.00  |
| 120 | W   | 0  | 0.11 | 0.11 | 110.0 | 0         | 0       | 0       | 0   | 5.69 | 0       | 17.79 | 17.79 |
| 121 | 4A2 | 1  | 0.19 | 0.17 | 0.8   | IB:S16-20 | 152,956 | 0       | 265 | 0.00 | 122,577 | 0.15  | 0.14  |
| 122 | 4A2 | 3  | 0.25 | 0.17 | 0.8   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 136,586 | 0.20  | 0.14  |
| 123 | 4A2 | 2  | 0.22 | 0.17 | 1.1   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 187,805 | 0.24  | 0.19  |
| 124 | 4A2 | 3  | 0.17 | 0.25 | 0.7   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 119,512 | 0.12  | 0.18  |
| 125 | 4A2 | 0  | 0.17 | 0.17 | 0.3   | I:S16-20  | 165,507 | 0       | 265 | 0.00 | 49,732  | 0.05  | 0.05  |
| 126 | 4A2 | 2  | 0.22 | 0.17 | 0.5   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 85,366  | 0.11  | 0.09  |
| 127 | 4A2 | 8  | 0.45 | 0.25 | 0.5   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 85,366  | 0.23  | 0.13  |
| 128 | 4A2 | 4  | 0.29 | 0.18 | 0.5   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 85,366  | 0.15  | 0.09  |
| 129 | 4A2 | 3  | 0.17 | 0.25 | 1.1   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 187,805 | 0.19  | 0.28  |
| 130 | 4A2 | 0  | 0.17 | 0.17 | 1.5   | II:S16-20 | 202,659 | 0       | 265 | 0.00 | 304,386 | 0.26  | 0.26  |
| 131 | 4A2 | 5  | 0.32 | 0.19 | 0.8   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 136,586 | 0.26  | 0.15  |
| 132 | 4A2 | 3  | 0.25 | 0.17 | 0.6   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 102,439 | 0.15  | 0.10  |
| 133 | 4A2 | 5  | 0.32 | 0.19 | 0.7   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 119,512 | 0.22  | 0.13  |
| 134 | 4A2 | 4  | 0.18 | 0.29 | 1.3   | II:S16-20 | 170,467 | 0       | 265 | 0.00 | 221,952 | 0.23  | 0.38  |
| 135 | 4A2 | 3  | 0.17 | 0.25 | 1.2   | IB:S16-20 | 152,956 | 0       | 265 | 0.00 | 183,865 | 0.20  | 0.30  |
| 136 | 4C2 | 5  | 0.24 | 0.36 | 0.4   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 54,602  | 0.10  | 0.14  |
| 137 | 4A2 | 0  | 0.17 | 0.17 | 0.8   | IA:S16-20 | 173,574 | 0       | 265 | 0.00 | 139,071 | 0.14  | 0.14  |
| 138 | 4B2 | 2  | 0.20 | 0.24 | 0.8   | IA:S14-10 | 158,120 | 0       | 265 | 0.00 | 126,708 | 0.16  | 0.19  |
| 139 | 4B2 | 0  | 0.20 | 0.20 | 1.1   | IA:S14-10 | 158,120 | 0       | 265 | 0.00 | 174,224 | 0.22  | 0.22  |
| 140 | 4A2 | 2  | 0.17 | 0.22 | 1.1   | I:S16-20  | 165,507 | 0       | 265 | 0.00 | 182,349 | 0.19  | 0.24  |
| 141 | 4A2 | 0  | 0.17 | 0.17 | 1.4   | U:S16-20  | 51,337  | 0       | 265 | 0.00 | 72,243  | 0.24  | 0.24  |
| 142 | 4A2 | 0  | 0.17 | 0.17 | 0.5   | IA:S16-20 | 173,574 | 0       | 265 | 0.00 | 86,920  | 0.09  | 0.09  |
| 143 | 4B2 | 1  | 0.24 | 0.20 | 1.0   | I:S16-20  | 165,507 | 150,000 | 265 | 0.00 | 315,772 | 0.24  | 0.20  |
| 144 | 4A2 | 3  | 0.25 | 0.17 | 0.9   | IB:S16-20 | 152,956 | 0       | 265 | 0.00 | 137,899 | 0.23  | 0.15  |
| 145 | 4A2 | 0  | 0.17 | 0.17 | 0.6   | U:S14-10  | 37,249  | 0       | 265 | 0.00 | 22,508  | 0.10  | 0.10  |
| 146 | 4C2 | 0  | 0.24 | 0.24 | 0.4   | IA:S14-10 | 158,120 | 0       | 265 | 0.00 | 63,354  | 0.10  | 0.10  |
| 147 | 4A2 | 0  | 0.17 | 0.17 | 0.7   | U:S14-10  | 37,249  | 163,000 | 265 | 0.00 | 139,260 | 0.12  | 0.12  |
| 148 | 4B2 | 2  | 0.20 | 0.24 | 0.4   | IA:S14-10 | 158,120 | 0       | 265 | 0.00 | 63,354  | 0.08  | 0.10  |
| 149 | 4C2 | 2  | 0.20 | 0.24 | 0.8   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 109,205 | 0.16  | 0.19  |
| 150 | 4C2 | 0  | 0.24 | 0.24 | 0.2   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 29,775  | 0.05  | 0.05  |
| 151 | 4A2 | 0  | 0.17 | 0.17 | 1.3   | IA:S14-10 | 158,120 | 0       | 265 | 0.00 | 205,901 | 0.22  | 0.22  |
| 152 | 4C2 | 12 | 0.53 | 0.33 | 0.3   | II:S14-10 | 142,808 | 0       | 265 | 0.00 | 42,922  | 0.16  | 0.10  |
| 153 | 4C2 | 2  | 0.26 | 0.24 | 1.1   | II:S14-10 | 142,808 | 0       | 265 | 0.00 | 157,380 | 0.29  | 0.26  |
| 154 | 4C2 | 6  | 0.39 | 0.24 | 0.5   | II:S14-10 | 142,808 | 0       | 265 | 0.00 | 71,537  | 0.20  | 0.12  |
| 155 | 4C2 | 1  | 0.24 | 0.24 | 1.8   | IA:S14-10 | 158,120 | 0       | 265 | 0.00 | 285,093 | 0.43  | 0.43  |
| 156 | 4C2 | 1  | 0.28 | 0.28 | 0.7   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 104,214 | 0.20  | 0.20  |
| 157 | 4C2 | 3  | 0.29 | 0.24 | 1.1   | II:S14-10 | 142,808 | 0       | 265 | 0.00 | 157,380 | 0.32  | 0.26  |

|     |     |    |      |      |       |             |         |        |     |      |           |       |       |
|-----|-----|----|------|------|-------|-------------|---------|--------|-----|------|-----------|-------|-------|
| 158 | 4E2 | 1  | 0.21 | 0.20 | 0.8   | I: S14-10   | 148,612 | 0      | 265 | 0.00 | 119,102   | 0.17  | 0.16  |
| 159 | 4C2 | 1  | 0.24 | 0.24 | 2.3   | I: S14-20   | 151,888 | 0      | 265 | 0.00 | 349,952   | 0.55  | 0.55  |
| 160 | 4C2 | 3  | 0.24 | 0.29 | 0.6   | I: S14-20   | 151,888 | 0      | 265 | 0.00 | 91,292    | 0.14  | 0.17  |
| 161 | 4D2 | 3  | 0.28 | 0.31 | 0.9   | I: S14-20   | 151,888 | 0      | 265 | 0.00 | 136,938   | 0.25  | 0.28  |
| 162 | 4C2 | 1  | 0.24 | 0.24 | 1.8   | IA: S14-20  | 161,126 | 0      | 265 | 0.00 | 290,504   | 0.43  | 0.43  |
| 163 | 4E2 | 2  | 0.20 | 0.24 | 2.6   | IA: S14-20  | 161,126 | 0      | 265 | 0.00 | 419,617   | 0.52  | 0.62  |
| 164 | 4E2 | 2  | 0.20 | 0.24 | 1.4   | IA: S14-20  | 161,126 | 0      | 265 | 0.00 | 225,947   | 0.28  | 0.34  |
| 165 | LIF | 0  | 0.00 | 0.00 | 0.1   | 0           | 523,038 | 0      | 0   | 0.00 | 523,038   | 0.00  | 0.00  |
| 166 | W   | 0  | 0.11 | 0.11 | 110.0 | 0           | 0       | 0      | 0   | 5.69 | 0         | 17.79 | 17.79 |
| 167 | 4C2 | 6  | 0.39 | 0.24 | 1.0   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 136,506   | 0.39  | 0.24  |
| 168 | 4E2 | 2  | 0.20 | 0.24 | 1.9   | IA: S14-10  | 158,120 | 0      | 265 | 0.00 | 300,931   | 0.38  | 0.46  |
| 169 | 4C2 | 2  | 0.24 | 0.20 | 0.6   | I: S14-10   | 148,120 | 0      | 265 | 0.00 | 89,031    | 0.14  | 0.12  |
| 171 | 4C2 | 3  | 0.24 | 0.29 | 0.7   | IA: S14-10  | 158,120 | 0      | 265 | 0.00 | 110,870   | 0.17  | 0.20  |
| 172 | 4C2 | 0  | 0.24 | 0.24 | 1.1   | IA: S14-10  | 158,120 | 0      | 265 | 0.00 | 174,224   | 0.26  | 0.26  |
| 173 | 4C2 | 0  | 0.24 | 0.24 | 1.3   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 177,458   | 0.31  | 0.31  |
| 174 | 4C2 | 6  | 0.24 | 0.39 | 0.5   | I: S14-10   | 148,612 | 0      | 265 | 0.00 | 74,439    | 0.12  | 0.20  |
| 175 | 4C2 | 3  | 0.24 | 0.29 | 0.7   | I: S14-10   | 148,612 | 0      | 265 | 0.00 | 104,214   | 0.17  | 0.20  |
| 176 | 4C2 | 6  | 0.24 | 0.39 | 0.5   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 58,253    | 0.12  | 0.20  |
| 177 | 4E2 | 2  | 0.24 | 0.20 | 1.9   | IA: S14-20  | 161,126 | 0      | 265 | 0.00 | 306,643   | 0.46  | 0.38  |
| 178 | 4E2 | 0  | 0.20 | 0.20 | 0.3   | IA: S14-20  | 161,126 | 0      | 265 | 0.00 | 48,417    | 0.06  | 0.06  |
| 179 | 4E2 | 0  | 0.20 | 0.20 | 0.4   | IA: S14-20  | 161,126 | 0      | 265 | 0.00 | 64,556    | 0.08  | 0.08  |
| 180 | 4E2 | 0  | 0.20 | 0.20 | 0.6   | I: S14-20   | 151,888 | 0      | 265 | 0.00 | 91,292    | 0.12  | 0.12  |
| 181 | 4E2 | 2  | 0.20 | 0.24 | 1.0   | I: S14-20   | 151,888 | 0      | 265 | 0.00 | 152,153   | 0.20  | 0.24  |
| 182 | 4C2 | 8  | 0.26 | 0.46 | 1.3   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 177,458   | 0.34  | 0.60  |
| 183 | 4C2 | 2  | 0.24 | 0.26 | 1.1   | I: S14-10   | 148,612 | 0      | 265 | 0.00 | 163,765   | 0.26  | 0.29  |
| 184 | 4C2 | 0  | 0.24 | 0.24 | 0.4   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 54,602    | 0.10  | 0.10  |
| 185 | 4C2 | 2  | 0.24 | 0.26 | 0.8   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 109,205   | 0.19  | 0.21  |
| 186 | 4D2 | 10 | 0.31 | 0.34 | 0.6   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 81,904    | 0.19  | 0.32  |
| 187 | 4C2 | 12 | 0.33 | 0.53 | 0.4   | I: S14-10   | 148,612 | 0      | 265 | 0.00 | 59,551    | 0.13  | 0.21  |
| 188 | 4C2 | 10 | 0.28 | 0.33 | 0.2   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 27,301    | 0.06  | 0.11  |
| 189 | 4D2 | 3  | 0.28 | 0.31 | 0.8   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 109,205   | 0.22  | 0.25  |
| 190 | 4D2 | 5  | 0.28 | 0.33 | 0.6   | I: S14-10   | 148,612 | 0      | 265 | 0.00 | 89,326    | 0.17  | 0.23  |
| 191 | 4D2 | 3  | 0.28 | 0.31 | 0.6   | I: S14-10   | 148,612 | 0      | 265 | 0.00 | 89,326    | 0.17  | 0.19  |
| 192 | 4D2 | 7  | 0.28 | 0.44 | 0.4   | II: S14-10  | 142,808 | 0      | 265 | 0.00 | 57,229    | 0.11  | 0.18  |
| 193 | 4D2 | 5  | 0.28 | 0.38 | 1.2   | II: S14-10  | 142,808 | 0      | 265 | 0.00 | 171,688   | 0.34  | 0.46  |
| 194 | 4C2 | 2  | 0.24 | 0.26 | 2.7   | II: S14-10  | 142,808 | 0      | 265 | 0.00 | 436,297   | 0.65  | 0.70  |
| 195 | 4D2 | 4  | 0.28 | 0.34 | 0.5   | II: S14-10  | 142,808 | 0      | 265 | 0.00 | 71,537    | 0.14  | 0.17  |
| 196 | 4D2 | 5  | 0.28 | 0.38 | 1.6   | III: S14-10 | 160,292 | 0      | 265 | 0.00 | 256,891   | 0.45  | 0.61  |
| 197 | 4D2 | 3  | 0.28 | 0.31 | 1.2   | III: S14-10 | 160,292 | 0      | 265 | 0.00 | 192,668   | 0.34  | 0.37  |
| 198 | 4D2 | 10 | 0.31 | 0.34 | 0.6   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 81,904    | 0.19  | 0.32  |
| 199 | 4D2 | 4  | 0.28 | 0.34 | 1.6   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 218,410   | 0.45  | 0.54  |
| 200 | 4D2 | 3  | 0.28 | 0.38 | 0.9   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 122,855   | 0.25  | 0.34  |
| 201 | 4D2 | 6  | 0.28 | 0.41 | 1.6   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 218,410   | 0.45  | 0.66  |
| 202 | 4C2 | 3  | 0.24 | 0.29 | 0.3   | IB: S16-20  | 152,956 | 0      | 265 | 0.00 | 45,966    | 0.07  | 0.09  |
| 203 | 4C2 | 4  | 0.24 | 0.32 | 0.7   | IB: S16-20  | 152,956 | 0      | 265 | 0.00 | 107,255   | 0.17  | 0.22  |
| 204 | 4C2 | 3  | 0.24 | 0.29 | 7.7   | VI: S16-20  | 369,690 | 0      | 265 | 0.00 | 2,848,654 | 1.85  | 2.23  |
| 205 | 4C2 | 6  | 0.24 | 0.39 | 1.7   | VI: S16-20  | 369,690 | 0      | 265 | 0.00 | 628,923   | 0.41  | 0.66  |
| 206 | 4C2 | 7  | 0.25 | 0.42 | 1.9   | IV: S16-20  | 270,094 | 0      | 265 | 0.00 | 513,682   | 0.48  | 0.80  |
| 207 | 4C2 | 1  | 0.24 | 0.24 | 1.4   | I: S16-20   | 165,507 | 0      | 265 | 0.00 | 232,081   | 0.34  | 0.34  |
| 208 | 4D2 | 4  | 0.28 | 0.34 | 1.3   | VI: S16-20  | 369,690 | 0      | 265 | 0.00 | 430,942   | 0.36  | 0.44  |
| 209 | 4D2 | 4  | 0.28 | 0.34 | 6.6   | VI: S16-20  | 369,690 | 0      | 265 | 0.00 | 2,441,703 | 1.85  | 2.24  |
| 210 | 4E2 | 1  | 0.20 | 0.21 | 0.9   | IB: S16-20  | 152,956 | 0      | 265 | 0.00 | 137,899   | 0.18  | 0.19  |
| 211 | 4E2 | 2  | 0.20 | 0.24 | 0.5   | IB: S16-20  | 152,956 | 97,000 | 265 | 0.00 | 173,611   | 0.10  | 0.12  |
| 212 | 4D2 | 6  | 0.28 | 0.41 | 0.8   | II: S14-10  | 142,808 | 0      | 265 | 0.00 | 114,458   | 0.22  | 0.33  |
| 213 | 4D2 | 4  | 0.28 | 0.34 | 1.1   | IB: S14-10  | 136,241 | 0      | 265 | 0.00 | 150,157   | 0.31  | 0.37  |



|     |     |    |      |      |      |            |         |         |     |      |         |       |       |
|-----|-----|----|------|------|------|------------|---------|---------|-----|------|---------|-------|-------|
| 214 | AD2 | 7  | 0.23 | 0.44 | 0.6  | 11:514-10  | 142,808 | 0       | 265 | 0.00 | 35,844  | 0.17  | 0.26  |
| 215 | AD2 | 6  | 0.28 | 0.41 | 0.3  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 40,952  | 0.08  | 0.12  |
| 216 | AD2 | 5  | 0.28 | 0.38 | 2.4  | 111:514-10 | 160,292 | 0       | 265 | 0.00 | 385,337 | 0.67  | 0.91  |
| 217 | LTF | 0  | 0.17 | 0.17 | 0.2  | U:514-10   | 37,249  | 192,408 | 265 | 0.00 | 199,911 | 0.03  | 0.03  |
| 218 | LTF | 0  | 0.00 | 0.00 | 0.1  | 0          | 0       | 8,200   | 0   | 0.00 | 8,200   | 0.00  | 0.00  |
| 219 | W   | 0  | 0.11 | 0.11 | 80.0 | 0          | 0       | 0       | 0   | 5.69 | 0       | 14.49 | 14.49 |
| 220 | W   | 0  | 0.11 | 0.11 | 80.0 | 0          | 0       | 0       | 0   | 5.69 | 0       | 14.49 | 14.49 |
| 221 | AD2 | 13 | 0.35 | 0.54 | 0.5  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 68,253  | 0.18  | 0.27  |
| 222 | AD2 | 6  | 0.28 | 0.41 | 1.0  | 11:514-10  | 142,808 | 0       | 265 | 0.00 | 143,073 | 0.28  | 0.41  |
| 223 | AD2 | 4  | 0.28 | 0.34 | 1.4  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 191,108 | 0.39  | 0.48  |
| 224 | AD2 | 3  | 0.28 | 0.31 | 1.2  | 11:514-10  | 142,808 | 0       | 265 | 0.00 | 171,688 | 0.34  | 0.37  |
| 225 | AD2 | 6  | 0.28 | 0.41 | 1.3  | 111:514-10 | 160,292 | 0       | 265 | 0.00 | 208,724 | 0.36  | 0.53  |
| 226 | AD2 | 3  | 0.20 | 0.27 | 0.7  | 1:514-10   | 148,612 | 0       | 265 | 0.00 | 104,214 | 0.14  | 0.19  |
| 227 | AC2 | 10 | 0.29 | 0.53 | 0.2  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 27,301  | 0.06  | 0.11  |
| 228 | AC2 | 6  | 0.24 | 0.39 | 0.3  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 40,952  | 0.07  | 0.12  |
| 230 | AC2 | 4  | 0.37 | 0.24 | 0.5  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 68,253  | 0.16  | 0.12  |
| 231 | AC2 | 3  | 0.29 | 0.24 | 0.7  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 95,554  | 0.20  | 0.17  |
| 232 | AC2 | 2  | 0.26 | 0.24 | 1.1  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 150,157 | 0.29  | 0.26  |
| 233 | AC2 | 5  | 0.36 | 0.24 | 0.8  | 1:514-10   | 148,612 | 0       | 265 | 0.00 | 119,102 | 0.29  | 0.19  |
| 234 | AC2 | 0  | 0.24 | 0.24 | 0.8  | 1:514-10   | 148,612 | 0       | 265 | 0.00 | 119,102 | 0.19  | 0.19  |
| 235 | AC2 | 0  | 0.24 | 0.24 | 0.4  | 1:514-10   | 148,612 | 0       | 265 | 0.00 | 59,531  | 0.10  | 0.10  |
| 236 | AD2 | 3  | 0.28 | 0.31 | 1.5  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 204,759 | 0.42  | 0.47  |
| 237 | AD2 | 5  | 0.28 | 0.38 | 2.2  | 11:514-10  | 142,808 | 0       | 265 | 0.00 | 314,761 | 0.62  | 0.84  |
| 238 | AC2 | 3  | 0.29 | 0.24 | 0.7  | 1:514-10   | 148,612 | 0       | 265 | 0.00 | 104,214 | 0.20  | 0.17  |
| 239 | AC2 | 2  | 0.24 | 0.26 | 0.5  | 1A:514-10  | 158,120 | 0       | 265 | 0.00 | 79,193  | 0.12  | 0.13  |
| 240 | LTF | 0  | 0.00 | 0.00 | 0.1  | 0          | 0       | 100,000 | 0   | 0.00 | 100,000 | 0.00  | 0.00  |
| 241 | AD2 | 1  | 0.28 | 0.28 | 1.7  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 232,060 | 0.48  | 0.48  |
| 242 | AD2 | 6  | 0.28 | 0.41 | 0.3  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 40,952  | 0.08  | 0.12  |
| 243 | AD2 | 10 | 0.31 | 0.33 | 1.5  | 11:514-10  | 142,808 | 0       | 265 | 0.00 | 214,610 | 0.47  | 0.80  |
| 244 | AD2 | 9  | 0.30 | 0.51 | 1.4  | 11:514-10  | 142,808 | 0       | 265 | 0.00 | 200,302 | 0.42  | 0.71  |
| 245 | AD2 | 3  | 0.28 | 0.31 | 0.6  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 31,904  | 0.17  | 0.19  |
| 246 | AD2 | 6  | 0.28 | 0.41 | 0.4  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 54,602  | 0.11  | 0.16  |
| 247 | AD2 | 2  | 0.28 | 0.28 | 0.2  | 1B:514-10  | 136,241 | 0       | 265 | 0.00 | 27,301  | 0.06  | 0.06  |
| 248 | AD2 | 3  | 0.28 | 0.31 | 0.7  | 11:514-10  | 142,808 | 0       | 265 | 0.00 | 100,151 | 0.20  | 0.22  |
| 249 | AC2 | 2  | 0.26 | 0.24 | 1.5  | 1:514-10   | 151,888 | 0       | 265 | 0.00 | 228,230 | 0.39  | 0.36  |
| 250 | AC2 | 5  | 0.36 | 0.24 | 0.4  | 1:514-20   | 151,888 | 0       | 265 | 0.00 | 60,861  | 0.14  | 0.10  |
| 251 | AC2 | 2  | 0.24 | 0.20 | 2.9  | 1:514-20   | 151,888 | 0       | 265 | 0.00 | 441,244 | 0.70  | 0.58  |
| 252 | AC2 | 0  | 0.20 | 0.20 | 0.1  | 1:514-20   | 151,888 | 0       | 265 | 0.00 | 15,215  | 0.02  | 0.02  |
| 253 | AC2 | 3  | 0.20 | 0.20 | 1.7  | 1:514-20   | 151,888 | 0       | 265 | 0.00 | 238,660 | 0.34  | 0.34  |
| 254 | AC2 | 2  | 0.27 | 0.20 | 1.1  | 1:514-20   | 151,888 | 0       | 265 | 0.00 | 167,368 | 0.30  | 0.22  |
| 255 | AC2 | 0  | 0.20 | 0.20 | 0.7  | 1:514-20   | 151,888 | 0       | 265 | 0.00 | 106,507 | 0.14  | 0.14  |
| 256 | AC2 | 2  | 0.20 | 0.24 | 0.8  | 11:514-20  | 152,825 | 0       | 265 | 0.00 | 122,472 | 0.16  | 0.19  |
| 257 | AC2 | 5  | 0.21 | 0.34 | 0.7  | 1B:514-20  | 139,711 | 0       | 265 | 0.00 | 77,983  | 0.15  | 0.24  |
| 258 | AC2 | 0  | 0.20 | 0.20 | 0.5  | 1B:514-20  | 139,711 | 0       | 265 | 0.00 | 69,988  | 0.10  | 0.10  |
| 259 | AC2 | 2  | 0.20 | 0.24 | 1.3  | 1:514-20   | 151,888 | 0       | 265 | 0.00 | 177,799 | 0.26  | 0.31  |
| 260 | AC2 | 0  | 0.20 | 0.20 | 0.5  | 1:514-20   | 151,888 | 0       | 265 | 0.00 | 76,077  | 0.10  | 0.10  |
| 261 | AC2 | 5  | 0.24 | 0.36 | 0.8  | 1:514-20   | 151,888 | 0       | 265 | 0.00 | 121,722 | 0.19  | 0.29  |
| 262 | AC2 | 3  | 0.32 | 0.24 | 0.6  | 11:514-20  | 152,825 | 0       | 265 | 0.00 | 91,854  | 0.19  | 0.14  |
| 263 | AC2 | 4  | 0.39 | 0.24 | 0.5  | 11:514-20  | 152,825 | 0       | 265 | 0.00 | 76,545  | 0.20  | 0.12  |
| 264 | AC2 | 6  | 0.24 | 0.24 | 0.9  | 11:514-20  | 152,825 | 0       | 265 | 0.00 | 137,781 | 0.22  | 0.22  |
| 265 | AC2 | 6  | 0.36 | 0.39 | 0.3  | 11:514-20  | 152,825 | 0       | 265 | 0.00 | 45,927  | 0.11  | 0.12  |
| 266 | AC2 | 5  | 0.24 | 0.24 | 0.4  | 11:514-20  | 152,825 | 0       | 265 | 0.00 | 61,236  | 0.10  | 0.10  |
| 267 | AC2 | 2  | 0.24 | 0.26 | 0.6  | 11:514-20  | 152,825 | 0       | 265 | 0.00 | 91,854  | 0.14  | 0.16  |
| 268 | AC2 | 5  | 0.24 | 0.36 | 0.7  | 11:514-20  | 152,825 | 0       | 265 | 0.00 | 107,163 | 0.17  | 0.25  |

|     |     |    |      |      |       |           |         |         |     |      |         |       |       |
|-----|-----|----|------|------|-------|-----------|---------|---------|-----|------|---------|-------|-------|
| 269 | 4C2 | 5  | 0.24 | 0.36 | 0.4   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 30,861  | 0.10  | 0.14  |
| 270 | 4C2 | 2  | 0.24 | 0.26 | 1.1   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 167,368 | 0.26  | 0.29  |
| 271 | 4C2 | 3  | 0.24 | 0.29 | 0.6   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 91,292  | 0.14  | 0.17  |
| 272 | 4C2 | 11 | 0.31 | 0.53 | 3.1   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 471,674 | 0.96  | 1.64  |
| 273 | 4C2 | 2  | 0.24 | 0.26 | 0.6   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 91,292  | 0.14  | 0.16  |
| 274 | 4C2 | 2  | 0.24 | 0.26 | 0.5   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 76,077  | 0.12  | 0.13  |
| 275 | 4C2 | 0  | 0.24 | 0.24 | 0.6   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 91,292  | 0.14  | 0.14  |
| 276 | 4C2 | 0  | 0.24 | 0.24 | 0.8   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 121,722 | 0.19  | 0.19  |
| 277 | 4C2 | 0  | 0.24 | 0.24 | 0.5   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 76,077  | 0.12  | 0.12  |
| 278 | 4C2 | 0  | 0.24 | 0.24 | 1.3   | I:S14-20  | 151,888 | 0       | 265 | 0.00 | 197,799 | 0.31  | 0.31  |
| 279 | 4D2 | 4  | 0.34 | 0.28 | 0.7   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 104,214 | 0.24  | 0.20  |
| 280 | 4D2 | 2  | 0.28 | 0.28 | 1.0   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 148,877 | 0.28  | 0.28  |
| 281 | 4D2 | 3  | 0.31 | 0.28 | 1.1   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 163,765 | 0.34  | 0.31  |
| 282 | 4D2 | 0  | 0.28 | 0.28 | 0.2   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 29,775  | 0.06  | 0.06  |
| 283 | 4D2 | 1  | 0.28 | 0.28 | 1.9   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 282,866 | 0.53  | 0.53  |
| 284 | 4D2 | 6  | 0.41 | 0.28 | 1.0   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 148,877 | 0.41  | 0.28  |
| 285 | 4D2 | 0  | 0.28 | 0.28 | 0.4   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 59,551  | 0.11  | 0.11  |
| 286 | 4D2 | 2  | 0.28 | 0.28 | 0.5   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 68,253  | 0.14  | 0.14  |
| 287 | 4D2 | 2  | 0.28 | 0.28 | 0.7   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 95,554  | 0.20  | 0.20  |
| 288 | 4D2 | 2  | 0.28 | 0.28 | 0.5   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 68,253  | 0.14  | 0.14  |
| 289 | 4D2 | 2  | 0.28 | 0.28 | 0.3   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 40,952  | 0.08  | 0.08  |
| 290 | 4D2 | 7  | 0.28 | 0.44 | 0.4   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 59,551  | 0.11  | 0.18  |
| 291 | 4D2 | 6  | 0.28 | 0.41 | 0.5   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 74,439  | 0.14  | 0.21  |
| 292 | 4D2 | 3  | 0.28 | 0.31 | 1.0   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 148,877 | 0.28  | 0.31  |
| 293 | 4D2 | 6  | 0.28 | 0.41 | 0.6   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 89,326  | 0.17  | 0.25  |
| 294 | LTF | 0  | 0.00 | 0.00 | 0.1   | 0         | 0       | 100,000 | 0   | 0.00 | 100,000 | 0.00  | 0.00  |
| 295 | 4D2 | 4  | 0.28 | 0.34 | 1.2   | II:S14-10 | 142,808 | 0       | 265 | 0.00 | 171,588 | 0.34  | 0.41  |
| 296 | 4D2 | 0  | 0.28 | 0.28 | 0.4   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 59,551  | 0.11  | 0.11  |
| 297 | W   | 0  | 0.11 | 0.11 | 120.0 | 0         | 0       | 0       | 0   | 5.69 | 0       | 18.89 | 18.89 |
| 298 | 4C2 | 0  | 0.24 | 0.24 | 1.0   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 148,877 | 0.24  | 0.24  |
| 299 | 4C2 | 0  | 0.24 | 0.24 | 0.6   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 89,326  | 0.14  | 0.14  |
| 300 | 4C2 | 2  | 0.24 | 0.24 | 1.0   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 148,877 | 0.24  | 0.24  |
| 301 | 4C2 | 0  | 0.24 | 0.24 | 0.6   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 89,326  | 0.14  | 0.14  |
| 302 | 4C2 | 0  | 0.24 | 0.24 | 0.5   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 74,439  | 0.12  | 0.12  |
| 303 | LTF | 0  | 0.00 | 0.00 | 0.1   | 0         | 0       | 100,000 | 0   | 0.00 | 100,000 | 0.00  | 0.00  |
| 304 | W   | 0  | 0.11 | 0.11 | 130.0 | 0         | 0       | 0       | 0   | 5.69 | 0       | 19.99 | 19.99 |
| 305 | 4C2 | 0  | 0.24 | 0.24 | 0.4   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 59,551  | 0.10  | 0.10  |
| 306 | 4D2 | 6  | 0.41 | 0.28 | 1.0   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 148,877 | 0.41  | 0.28  |
| 307 | 4D2 | 5  | 0.38 | 0.28 | 0.6   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 89,326  | 0.23  | 0.17  |
| 308 | 4D2 | 3  | 0.31 | 0.28 | 0.3   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 44,663  | 0.09  | 0.08  |
| 309 | 4D2 | 5  | 0.38 | 0.28 | 0.4   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 59,551  | 0.15  | 0.11  |
| 310 | 4D2 | 2  | 0.28 | 0.28 | 0.4   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 59,551  | 0.11  | 0.11  |
| 311 | 4D2 | 2  | 0.28 | 0.28 | 1.2   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 178,652 | 0.34  | 0.34  |
| 312 | 4D2 | 0  | 0.28 | 0.28 | 0.6   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 89,326  | 0.17  | 0.17  |
| 313 | 4D2 | 0  | 0.28 | 0.28 | 0.3   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 44,663  | 0.08  | 0.08  |
| 314 | 4D2 | 4  | 0.34 | 0.28 | 0.9   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 133,989 | 0.31  | 0.25  |
| 315 | 4D2 | 4  | 0.34 | 0.28 | 1.4   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 208,428 | 0.48  | 0.39  |
| 316 | 4D2 | 2  | 0.28 | 0.28 | 0.5   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 68,253  | 0.14  | 0.14  |
| 317 | 4D2 | 0  | 0.28 | 0.28 | 0.6   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 89,326  | 0.17  | 0.17  |
| 318 | 4D2 | 4  | 0.34 | 0.28 | 0.7   | II:S14-10 | 142,808 | 0       | 265 | 0.00 | 100,151 | 0.24  | 0.20  |
| 319 | 4D2 | 6  | 0.44 | 0.28 | 0.8   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 109,203 | 0.35  | 0.22  |
| 320 | W   | 0  | 0.11 | 0.11 | 130.0 | 0         | 0       | 0       | 0   | 5.69 | 0       | 19.99 | 19.99 |
| 321 | 4D2 | 0  | 0.28 | 0.28 | 0.9   | I:S14-10  | 148,612 | 0       | 265 | 0.00 | 133,989 | 0.25  | 0.25  |
| 322 | 4D2 | 3  | 0.31 | 0.28 | 0.7   | IB:S14-10 | 136,241 | 0       | 265 | 0.00 | 95,554  | 0.22  | 0.20  |

|     |     |    |      |      |     |            |         |   |     |      |         |      |      |
|-----|-----|----|------|------|-----|------------|---------|---|-----|------|---------|------|------|
| 323 | 4D2 | 6  | 0.28 | 0.41 | 0.3 | II:S14-10  | 142,808 | 0 | 265 | 0.00 | 42,922  | 0.08 | 0.12 |
| 324 | 4D2 | 2  | 0.28 | 0.28 | 0.6 | I:S14-10   | 148,612 | 0 | 265 | 0.00 | 89,326  | 0.17 | 0.17 |
| 325 | 4D2 | 3  | 0.28 | 0.31 | 0.7 | I:S14-10   | 148,612 | 0 | 265 | 0.00 | 104,214 | 0.20 | 0.22 |
| 326 | 4D2 | 10 | 0.31 | 0.54 | 0.4 | IE:S14-10  | 136,241 | 0 | 265 | 0.00 | 54,602  | 0.12 | 0.22 |
| 327 | 4A2 | 0  | 0.17 | 0.17 | 0.7 | 9:S16-20   | 51,357  | 0 | 265 | 0.00 | 36,121  | 0.12 | 0.12 |
| 328 | 4D2 | 13 | 0.35 | 0.54 | 0.3 | IE:S16-20  | 152,956 | 0 | 265 | 0.00 | 45,966  | 0.11 | 0.16 |
| 329 | 4D2 | 3  | 0.28 | 0.31 | 1.0 | IE:S14-10  | 136,241 | 0 | 265 | 0.00 | 136,506 | 0.28 | 0.31 |
| 330 | 4A2 | 4  | 0.17 | 0.29 | 0.7 | IE:S16-20  | 152,956 | 0 | 265 | 0.00 | 107,255 | 0.12 | 0.20 |
| 331 | 4E2 | 4  | 0.30 | 0.20 | 0.5 | IE:S14-10  | 136,241 | 0 | 265 | 0.00 | 58,253  | 0.15 | 0.10 |
| 332 | 4E2 | 4  | 0.30 | 0.20 | 0.2 | IE:S14-10  | 136,241 | 0 | 265 | 0.00 | 27,301  | 0.06 | 0.04 |
| 333 | 4C2 | 2  | 0.24 | 0.26 | 1.7 | IA:S14-10  | 158,120 | 0 | 265 | 0.00 | 269,255 | 0.41 | 0.44 |
| 334 | 4C2 | 8  | 0.26 | 0.46 | 0.9 | II:S14-10  | 142,808 | 0 | 265 | 0.00 | 128,766 | 0.23 | 0.41 |
| 335 | 4D2 | 10 | 0.31 | 0.54 | 0.2 | II:S14-10  | 142,808 | 0 | 265 | 0.00 | 28,615  | 0.06 | 0.11 |
| 336 | 4D2 | 2  | 0.28 | 0.28 | 0.3 | II:S14-10  | 142,808 | 0 | 265 | 0.00 | 42,922  | 0.08 | 0.08 |
| 337 | 4D2 | 2  | 0.28 | 0.28 | 0.3 | II:S14-10  | 142,808 | 0 | 265 | 0.00 | 42,922  | 0.08 | 0.08 |
| 338 | 4D2 | 0  | 0.17 | 0.17 | 0.2 | 9:S14-10   | 37,249  | 0 | 265 | 0.00 | 7,503   | 0.03 | 0.03 |
| 339 | 4D2 | 10 | 0.31 | 0.54 | 0.4 | II:S14-10  | 142,808 | 0 | 265 | 0.00 | 57,229  | 0.12 | 0.22 |
| 340 | 4C2 | 8  | 0.26 | 0.46 | 0.5 | I:S14-10   | 148,612 | 0 | 265 | 0.00 | 74,439  | 0.13 | 0.23 |
| 341 | 4E2 | 0  | 0.20 | 0.20 | 0.5 | IA:S14-10  | 158,120 | 0 | 265 | 0.00 | 79,193  | 0.10 | 0.10 |
| 342 | 4D2 | 2  | 0.28 | 0.28 | 0.5 | IE:S14-10  | 136,241 | 0 | 265 | 0.00 | 68,253  | 0.14 | 0.14 |
| 343 | 4C2 | 4  | 0.32 | 0.24 | 0.8 | II:S14-10  | 142,808 | 0 | 265 | 0.00 | 114,458 | 0.26 | 0.19 |
| 344 | 4D2 | 8  | 0.29 | 0.51 | 0.7 | III:S14-10 | 160,292 | 0 | 265 | 0.00 | 112,390 | 0.20 | 0.36 |
| 345 | 4D2 | 6  | 0.28 | 0.41 | 0.3 | III:S14-10 | 160,292 | 0 | 265 | 0.00 | 48,167  | 0.08 | 0.12 |



## TRANSPORTATION PLAN COMPARISON AND FUNCTION

### Island Arterial Route

The Montague Island road system will be independent from major highway systems in the State of Alaska. The Island's arterial system is the base to reach water access points and specific inland locations. The location of this route is quite limited to lower elevations and upper beach fringe locations.

Around the southern tip of Montague Island the road has no options for the location other than an upper beach location. The only area for alternative location between Patton Bay and MacLeod Harbor is the region uplands of Jeanie Cove to Patton Bay.

Facilities constructed are long term developments. An administrative site for the current actions could be maintain for more than this entry. Assuming resource management would not jump around on the island, the arterial could be extended to the north and back to the south to complete a loop of major access for the island.

### Cost Sharing

The arterial route as displayed in Alternatives 4 - 6 is the only known opportunity to develop a cooperative or cost share agreement for road construction, use and maintenance. When a Record of Decision is issued then the share responsibility for the cooperators can be agreed upon. The agreement will be between Chugach Alaska Corporation and Forest Service.

### Over the Top

To review a route between the east and west shores we must make the assumption a need exists requiring an east-west route. The reasons may be varied and won't be expanded at this point.

Two feasible routes exist to tie the southeast and southwest regions together. One route is displayed in the Alternatives 4 - 6 (Maps L,M,N) following the beach zone around the southern tip of Montague Island. The other is to go over the mountain ridge which longitudinally divides the island.

The feasible mountain corridor uses a pass in the mountain ridgeline which is between the head waters of the Nellie Martin River and MacLeod Harbor at an elevation of 2,000 ft. The vertical climb from road systems on the east and west sides is approximately 1,800 ft.

The route over the mountains requires building on slopes up to 60% in upper slope vegetation and alpine environments. The soil layer is thin. A snow cap is present at the highest elevation for most of the year.

Functionally this road would serve as an arterial route. The road alignment includes several switchbacks. Tangent sections of the road are short. Grades will be as great as feasible for log trucks, the most critical vehicle which would use this route. Constructed grades should be expected to be 8 to 10% with pitches to 12 to 15%.

To keep the road surface in good operating condition and snow graded off for a normal operating season, maintenance is estimated to be 5 times more costly than a lower elevation route.

A route over the mountains will be approximately 11.5 miles long and cost \$4.0 million. The cost per mile is \$353,500. In comparison to road cost at lower elevations, road over the mountains costs more than twice as much.

Alternatives 4, 5 and 6 display a road following the shoreline around the southern tip of Montague Island. The comparison below is for the segments which interchangeably connect road systems developed to access the variety of projects in the alternatives.

| Shoreline Route |                     | Mountain Route |
|-----------------|---------------------|----------------|
| 8.7             | distance (miles)    | 11.5           |
| \$448,900       | total const. cost   | \$4,065,300    |
| \$51,600        | cost/mile           | \$353,500      |
| \$1.48          | haul cost (\$//mbf) | \$3.67         |

#### Net Value

Net Value determination used in this report is not the same as Present Worth or Net Present Value. The net value is not time discounted, it assumes instantaneous costs and values. The net value is the value minus the costs which can be associated with an action.

Timber value is \$340.88/mbf. Motorized Recreational Visitor Days are \$8.26/RVD. The road costs used in the calculations are the haul cost, construction cost, LTF construction cost, dumping and rafting and towing cost.

#### Log Transfer Facility (LTF)

LTFs are spoken to in Chapter 4, Environmental Consequences to disclose the environmental effects and again the section of this transportation plan on LTFs describing the sites and facilities.

From the viewpoint of a road system a review is necessary to identify LTF preferences. Its logical to expect the removal of commodities, (timber, mineral, etc.) would naturally tend to go to the closest island exit facility, LTF. If we are to look at the suitable timber on southern Montague Island as divided by the central mountain ridge then the timber is located in the southeast and southwest sections of the island.

The southeast timber has the option to exit from either the Wooded Island or Box Point LTF. The southwest timber will go to MacLeod Harbor.

Alternatives 4 - 6 are the only options with actions which would use an east side LTF. In alternatives 4 - 6, the net values are greater and positive when using the Box Point LTF. Alternative 4 net value with the Wooded Island LTF is negative. A comparison is shown below.

| Box Point   | Alternative | Wooded Island |
|-------------|-------------|---------------|
| \$1,063,056 | 4           | -\$163,132    |
| 1,971,368   | 5           | 741,039       |
| 1,942,603   | 6           | 710,762       |

Based on this analysis, Box Point is preferable to develop as LTF compared to Wooded Island. Box Point also has the better overall site condition of the two.

The two MacLeod Harbor sites have nearly equal net values when compared to one another. The North MacLeod site is a reconstruction project where South MacLeod is new construction. The difference in net value is the cost of road construction added for the NorthMacLeod Harbor LTF. The haul cost difference is small.

| North MacLeod | Alternative | South MacLeod |
|---------------|-------------|---------------|
| \$2,065,377   | 2           | \$2,190,437   |
| 4,280,752     | 3           | 4,409,498     |
| 2,260,725     | 4           | 2,388,614     |
| 4,020,069     | 5           | 4,150,686     |
| 3,935,644     | 6           | 4,000,488     |

The two MacLeod Harbor sites have similar overall site quality as well. Each has specific advantages, but none would prohibit use or development. Two conditions are, South MacLeod has a larger area for upland log storage and sorting, North MacLeod has a steeper underwater ground slope.

#### Unit Costs for the Analysis

The costs developed for this analysis and shown in the following tables were constructed using the Engineers Guide for Estimating Costs of Survey, Design and Construction of Roads and Bridges, Dec. 1, 1988. No update factor has been used with this table since update factors change periodically and these figures are for analytical purposes.

The table displaying road construction cost by Terrain Type is a method of being specific in a plan about the ground a proposed road will be constructed on. Terrain Types are classifications based on geographic description and soil productivity type. This work is prepared for island conditions as are found in Prince William Sound.



# Unit Cost Table 1

## Raft Towing

|                              |                   |
|------------------------------|-------------------|
| Sawlog towing 0-50 miles     | \$0.1574/mbf/mile |
| 51-100 miles                 | 0.1060/mbf/mile   |
| 100+ miles                   | 0.0979/mbf/mile   |
| Pulp log towing 0-50 miles   | \$0.1255/mbf/mile |
| 51-100 miles                 | 0.1135/mbf/mile   |
| 100+ miles                   | 0.1054/mbf/mile   |
| Log towing fixed add-on cost | \$1.78/mbf        |
| LTF, Dump & Raft             | \$5.69/mbf        |

## Construction Cost by Design Standard

|        |               |
|--------|---------------|
| S14-10 | (See Table 2) |
| S14-20 | (See Table 2) |
| S16-20 | (See Table 2) |
| S16-30 | (See Table 2) |

## Road Development costs

|                         |               |                    |            |
|-------------------------|---------------|--------------------|------------|
| Unclassified Excavation | \$3.80/cy     | Bridge - 60 ft     | \$97,000   |
| Commom Excavation       | \$0.95/cy     | Bridge - 70 ft     | \$130,000  |
| Rock Excavation         | \$7.66/cy     | Bridge - 80 ft     | \$145,000  |
| Rock Borrow             | \$5.71/cy     | Bridge - 90 ft     | \$150,000  |
| Haul                    | \$1.08/cy     | Bridge - 130 ft    | \$163,000  |
| Clearing                | \$2,965.00/ac | Rip Rap - Class VI | \$30.81/cy |
| Seeding                 | \$1,104.00/ac | Aggregate, Pit Run | \$10.16/cy |
| CMP 18"-24"             | \$27.88/lf    |                    |            |
| CMP 36"-84"             | \$94.74/lf    |                    |            |

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#### TERRAIN TYPE I

DESCRIPTION: Generally flat with some sections up to 20%. Ground profile gently rolling, allowing road grade to follow profile with minimum depth overlay. Occasional moderate V-Notch up to 15 feet deep.

SOIL PRODUCTIVITY TYPE: 30% muskeg (4 ft overlay), 50% scrub timber (3 ft overlay), 20 % commercial timber (2 ft overlay).

GEOGRAPHY: Inland valley bottom.

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#### TERRAIN TYPE 1A

DESCRIPTION: Same as Type 1, except for an increase in the amount of muskeg.

SOIL PRODUCTIVITY TYPE: 60% muskeg (4 ft overlay), 35% scrub timber (3 ft overlay), 5 % commercial timber (2 ft overlay).

GEOGRAPHY: Inland valley bottom.

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#### TERRAIN TYPE 1B

DESCRIPTION: Same as Type 1, except for a decrease in the amount of muskeg.

SOIL PRODUCTIVITY TYPE: 10% muskeg (4 ft overlay), 30% scrub timber (3 ft overlay), 60% commercial timber (2 ft overlay).

GEOGRAPHY: Inland valley bottom.

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#### TERRAIN TYPE II

DESCRIPTION: Moderately steep side slopes between 20% and 40%. Numerous moderate V-notches up to 20 feet deep. Rolling grade and alignment adjusted to fit terrain features.

SOIL PRODUCTIVITY TYPE: Scrub timber 25% (3 ft overlay), commercial timber 75% (2 ft overlay).

GEOGRAPHY: Mid lower slope and upper end valleys.

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### TERRAIN TYPE III

DESCRIPTION: Moderate to steep sideslopes 40% to 55%. Broken profile with numerous moderate to deep V-notches. Through cuts and through fills are used to avoid excessive grade rolling.

SOIL PRODUCTIVITY TYPE: 85% commercial timber (2 ft overlay), 15% scrub timber (3 ft overlay).

GEOGRAPHY: Mid to upper slopes.

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### TERRAIN TYPE IV

DESCRIPTION: Steep sideslopes 55% and greater.

SOIL PRODUCTIVITY TYPE: 75% commercial timber (2 ft overlay), 25% scrub timber (3 ft overlay).

GEOGRAPHY: Upper slopes and steep beach areas.

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### TERRAIN TYPE V

DESCRIPTION: Generally flat sideslopes with some sections up to 10%. Ground profile will be gently rolling allowing a road grade to follow the ground profile with minimum depth overlay. Natural ground solid and stable. Limited organic and soil layer depth over cobbles, boulders and bedrock.

SOIL PRODUCTIVITY TYPE: 75% barren ground (2 ft overlay), 25% scrub timber (2 ft overlay).

GEOGRAPHY: Open beach, uplifted beach and beach fringe areas.

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### TERRAIN TYPE VI

DESCRIPTION: Steep sideslopes greater than 65%. Natural ground solid and stable. Limited organic and soil layer depth over bedrock.

SOIL PRODUCTIVITY TYPE: 25% commercial timber (2 ft overlay), 50% alpine low brush vegetation (2 ft overlay), 25% barren ground (2 ft overlay).

GEOGRAPHY: Alpine areas.

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TABLE 2  
TERRAIN TYPES for PRINCE WILLIAM SOUND

Construction cost December 1988  
\$ per mile

| Terrain Type | S-10<br>14 | S-20<br>14 | S-20<br>16 |
|--------------|------------|------------|------------|
| I            | 148,612    | 151,888    | 165,507    |
| IA           | 158,120    | 161,126    | 173,574    |
| IB           | 136,241    | 139,711    | 152,956    |
| II           | 142,808    | 152,825    | 170,467    |
| III          | 160,292    | 177,516    | 202,659    |
| IV           | 206,871    | 240,179    | 270,094    |
| V            | 37,249     | 47,183     | 51,337     |
| VI           | 211,895    | 316,938    | 369,690    |

Average of Terrain Types for Prince William Sound  
\$ per mile

|     |         |         |         |
|-----|---------|---------|---------|
| All | 150,261 | 173,421 | 194,536 |
|-----|---------|---------|---------|

Average for Analytical Road based on all Terrain Types  
and Design Standards.

Average \$ per Mile, Prince William Sound

\$172,739

## LOG TRANSFER FACILITIES (LTF)

### Feasible LTF sites, southern Montague Island

Four sites have been identified as having potential for LTF development along the shore of southern Montague Island between Purple Bluffs on the east shore and Hanning Bay on the West. The sites are 1) North MacLeod Harbor, 2) South MacLeod Harbor, 3) unnamed point across from Wooded Island near Stump Lake (named Wooded Island for this report) and 4) Box Point.

More work will need to be prepared for the design and construction of an LTF. What work has to be accomplished will depend on the site. The MacLeod Harbor sites have been dove, while the outside sites have not. Some wind and wave action work has been done for Box Point, but not for the other sites.

### Site Descriptions

#### North MacLeod Harbor (see figure 1)

This site is located on the north side of the harbor adjacent to the uplands owned by Chugach Alaska Corporation. A slide, gravity or mechanical, is the proposed mechanical system. A LTF located here will not require the construction of a breakwater. This is a previously used site, last used in the mid-1970s.

An entry ramp will be 160 feet long and 30 feet wide. This is a naturally protected site, so no armour rock, rip rap or other protection measures will have to be used.

This site has been investigated for re-use by Alaska F&G, USF&WS and NMFS in June 1986 and reported in September 1986 along with 4 other sites along the southern shore of the harbor. A copy of the report is included in this chapter following the site sketches.

Offshore water depths taken from the dive report are -5 ft at 85 ft and -40 ft at 200 ft.

#### South MacLeod Harbor (see figure 2)

This site is located on the southern shore of MacLeod Harbor. As recorded in the 1986 dive report mentioned above, this is at or near site 3. The beach at this point is large and flat with out vegetative cover. A handling pad and ramp will be necessary for operating on this site. The end of the ramp at the -5 ft level is 875 ft from the shore where upland vegetation is established.

The ramp is designed for a mechanical slide entry device. This site could also be used to construct a facility for a lift off entry device. The most economic system is the slide device.

This site is located in the harbor to provide sufficient protection from wave action erosion without using rip rap or a breakwater.

Offshore water depth is -5 ft at 875 ft, -20 ft at 1,000 ft and -60 ft at 1,300 ft.

#### Wooded Island (see figure 3)

This site is located at the south end of Patton Bay on the east side of Montague Island. The uplands are managed by the Chugach National Forest. The conceptual design proposed a 2,100 ft breakwater sitting on the sand spit connecting Wooded Island to Montague Island. The LTF will be a ramp design for a slide, gravity or mechanical, entry devise.

The proposal is for a ramp 1,500 ft long and 30 ft wide. This is the minimum length a ramp can be built to be functional as a hydraulic lift or slide facility. At 1,500 ft the end of the ramp/slide is at MLLW elevation of 0.00 feet. A more functional ramp/slide would extend 2,000 ft in length placing the operating level of the ramp/slide at -5 ft elevation. The operating grade of the ramp/slide is to be 10%. Rip Rap will be necessary to protect the ramp. Adequate protection is expected for the ramp and associated rafting activities with the breakwater and rip rap surfacing.

Off shore water depth is -5 ft at 1,200 ft, -40 ft at 5,280 ft and -60 ft at 6,800 ft.

#### Box Point (see figure 4)

This proposal is located on a land projection north of Patton Bay, facing into Patton Bay. The adjacent uplands are owned by Chugach Alaska Corporation. This proposal involves constructing a breakwater of a minimum 900 ft long. The LTF will be a ramp design for a slide, gravity or mechanical, entry devise.

The proposal involves constructing a ramp 800 ft long and 30 ft wide from the current shoreline. This is the minimum length a ramp can be built to be functional as a hydraulic lift or slide facility. At 800 ft the end of the ramp/slide is at MLLW elevation of 0.00 feet. A more functional ramp/slide would extend 1,500 ft in length placing the operating level of the ramp/slide at -5 ft elevation. The operating grade of the ramp/slide is to be 10%. Rip Rap will be use to protect the ramp. Along with the breakwater, sufficient protection will be provided for the ramp and rafting areas.

In 1972 this site was the proposal for a LTF for Forest Service resource management on Montague Island. The proposal was for a 900 ft breakwater to be built out to two pinnacles of rock. The pinnacles were to be a borrow source for construction. For this report, the pinnacles are not borrow sources and the 900 ft breakwater is the minimum required for this site.

This site was once again looked at as a potential LTF site and reported to the Forest Service by CH2M Hill. This proposal looked at constructing a ship dock and log handling pad attached to a longer breakwater.

This proposal uses the minimum 900 ft length breakwater to protect the ramp/slide entry facility and having upland log handling area. A review of the



aerial photos and a visual inspection from an aircraft indicates rock is available along the shore for construction. The estimate of cost includes 50% of the required embankment to be found on site.

Offshore water depth is -5 ft at 300 ft, -40 ft at 2,100 ft and -60 ft at 2,300 ft.

#### Site Comparison Chart

| Site          | Upland<br>Log Storage | Off Shore<br>Quality | Cost       | Site<br>Quality | Site<br>Rank |
|---------------|-----------------------|----------------------|------------|-----------------|--------------|
| North MacLeod | good <u>1</u> /       | good                 | 8.2 (Low)  | good            | 2            |
| South MacLeod | excellent             | good                 | 192.4      | excellent       | 1            |
| Wooded Island | excellent             | poor                 | 523.0 (Hi) | fair            | 4            |
| Box Point     | fair <u>1</u> /       | good                 | 306.0      | good            | 3            |

1/ The uplands involved with this site are owned by Chugach Alaska Corp. Use of this site will require a cooperative agreement.

#### Assumptions for planning LTF sites

1. Ramp/slide log entry devises will be planned instead of lift-off devises unless ramp/slides are not feasible.
2. All the material necessary to construct the LTF facility is available in the planning area.
3. The log entry devise is not considered part of the LTF facility. This is equipment installed by the contractors.
4. The conceptual design for North MacLeod Harbor was provided by Paul Tweiten, Timber Division Manager for Chugach Alaska Corporation as part of his EPA/COE permit application.
5. The breakwaters structures used in this plan are not intended to prevent all wave action from entering the protected harbor area. It is to be expected that large storm activity may generate some waves which may break over the breakwater. The force of the waves is expected to be diminished to an acceptable level within the harbor.
6. Unit costs for the cost estimates are taken from the current R10 Engineering Cost Estimating Guide. The costs are used as current time and are not present in an economic analysis standard form.
7. Armour Rock and Rip Rap are not depicting the some material, though both are able to effectively provide some protection from the elements.

8. Structures built at the edge of or in shallow saltwater along the eastern shoreline of Montague Island are exposed to harsh environmental elements, wind and waves being the major considerations. Constructed in this environment without surface protection shortens the expected life span.
9. A limited amount of work has been done at the sites presented in this plan, mostly upland investigate plus in MacLeod Harbor subsurface investigation. Information such as wind and wave patterns and forces have not been prepared for all sites. In 1975, CH2M Hill prepared a report for the Forest Service for a LTF at Box Point which included wind and wave patterns and force. This information still has some value. More work is required before constructing a LTF on uplands managed by the Forest Service.

### Log Transfer Facility Types

LTFs can generally be grouped into two separate classes. There are the ramp/slide and lift-off facilities. Here is a brief discussions of the two types.

#### 1. Ramps/Slides

Ramps/slides is a group of very similar devises to transfer log bundles from land to water. A ramp can be used by itself or to provide the foundation for a slide entry system.

Ramps by themselves are used for using the ebb and flow of the tides to transfer wood. This is known as hydraulic lift. At low tide an operator begins placing log bundles on the ramp at waters edge, sitting each bundle next to the previous one. As the tide comes in the bundles are floated off the ramp and can be pulled out to the rafting area.

Slides can be of two types, gravity and mechanical. Either slide design uses the ramp then places structures on the surface which will cause the bundles to move over the ramp to the water.

A gravity slide is constructed at such an angle that allows the weight of the bundle to over come friction and move down the ramp without mechanical assistance. This design has to consider the material the rails are made of, steel for example. Designed properly, the bundle enter the water at an acceptable rate of speed.

A mechanical slide can vary in its approach to enter bundles into the water. A chain drive unit cradles bundles and lowers them into the water at a controlled rate of speed. Another mechanical slide is constructed similar to a gravity system but less than 10% grade. This angle is not enough to allow gravity to move the bundles. A loader sets the bundles on the rails and pushes them at a controlled rate into the water.

#### 2. Lift-off

There are two common approaches to used by operators for transferring bundles to the water. One is to bring a crane onto the facility, the other is to use a gantry machine.

Cranes are able to lift the heaviest loads hauled by off-highway log trucks. The crane itself has mobility limited to the size of the pad. The crane can lift and maneuver a load. Entry of a bundle into the water is under a controlled rate of speed. Cranes are often used on facilities which need to transfer a large number of log bundles a day or a number of years.

Gantry machines come in two types, static or mobile framed. A common name for this type of machine is an A-Frame due to its construction configuration. Both systems are capable of lifting the heavier loads carried by off-highway log trucks.

The single A-Frame is anchored to the ground making it static in position. A bundle of logs is lifted from the truck and swung out to and lowered into the water. The operator has control of the load and water entry is under controlled rate of speed.

The mobile A-Frame is a dual framed system with one anchored static A-Frame and the other mobile controlling lifting and moving of the load. The operator has an increased amount of control with this configuration from point of lift to water entry.



Quantities Comparison Table  
(in cubic yards)

| Site          | Excavation | Embankment | Aggregate | Haul   | Rip Rap |
|---------------|------------|------------|-----------|--------|---------|
| North MacLeod | 0          | 1,200      | 0         | 1,200  | 0       |
| South MacLeod | 0          | 28,337     | 0         | 28,337 | 0       |
| Wooded        | 0          | 48,444     | 0         | 48,444 | 6,300   |
| Box Point     | 0          | 29,023     | 0         | 14,511 | 4,044   |

Economic Comparison Table  
(in \$1,000.00)

| Site          | Excavation | Embankment | Aggregate | Haul | Rip Rap |
|---------------|------------|------------|-----------|------|---------|
| North MacLeod | 0          | 6.9        | 0         | 1.3  | 0       |
| South MacLeod | 0          | 161.8      | 0         | 30.6 | 0       |
| Wooded        | 0          | 276.6      | 0         | 52.3 | 194.1   |
| Box Point     | 0          | 165.7      | 0         | 15.7 | 124.6   |

TOTAL COST  
(per \$1,000.00)

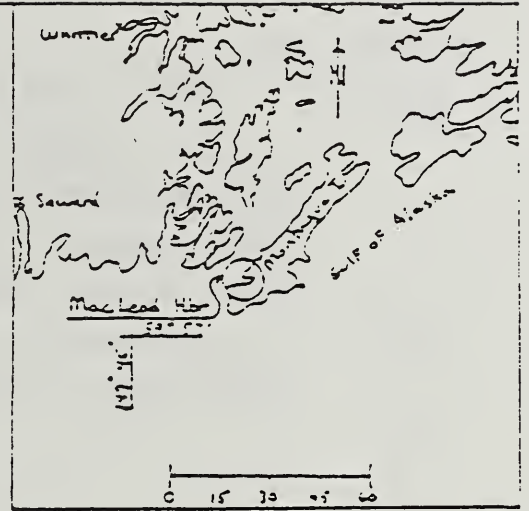
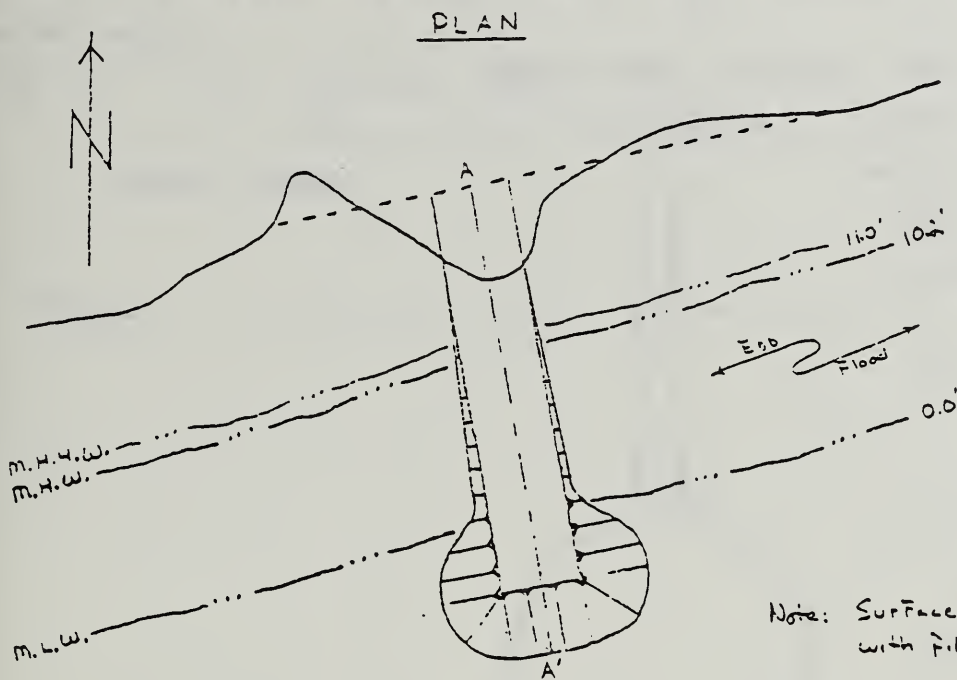
|               |         |
|---------------|---------|
| North MacLeod | \$ 8.2  |
| South MacLeod | \$192.4 |
| Wooded Island | \$523.0 |
| Box Point     | \$306.0 |

The costs displayed arrived at using the listed quantities and unit prices taken from the current Region 10 Engineers Guide for Estimative Costs of Survey, Design and Construction of Roads and Bridges. The effective date is December 1, 1988.

The unit price for Rip Rap is for machine placed Class VI Rip Rap. The size gradient for Class VI Rip Rap like all other classed is detailed in Section 619 of the Forest Service Specifications for Construction of Roads and Bridges, April 1985.

No update factors have been used in the cost displays. This purpose of the tables is for analytic computations and coupled with the current date of the cost guide update factors were not used.

# LTF MACLEOD HARBOR NORTH SIDE

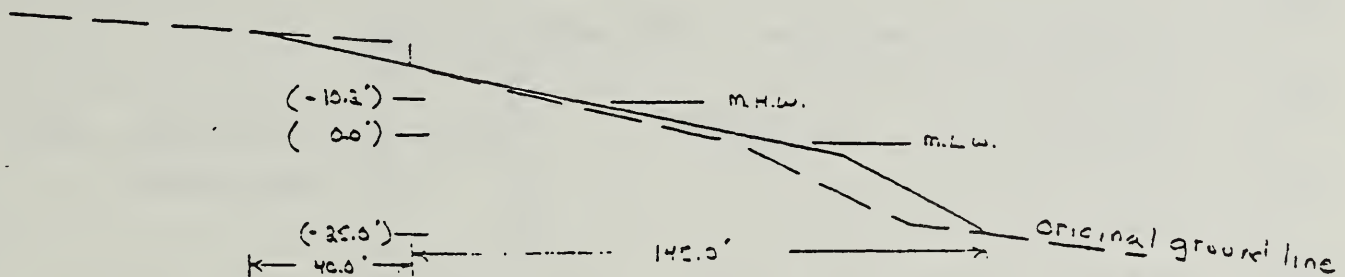


Note: Surface of ramp measures 30 ft x 160 ft with fill slopes placed at 1 1/4 : 1.

Note: Approximately 1,200 cu. yds. of rock fill will be utilized in this project.

Note: Upland ownership is Chugach Alaska Corporation.

## ELEVATION (AA')



Note: Approximately 185 ft total distance to -40 ft depth.

CHUGACH ALASKA CORPORATION  
3000 A ST. SUITE 400  
ANCHORAGE, ALASKA 99503

Proposed Log Transfer Facility consisting of rock fill and steel rails placed at 15% gradient for non-violent movement of logs to water. Located on the north side of MacLeod Harbor on Montague Island, Alaska.

Sheet 02

10-94-86

FIGURE 1



SAM GRIMES

1-11-89

## LTF, MACLEOD HARBOR SOUTH SIDE

## RAMP - SLIDE FACILITY

END RAMP ELEV: -5 FT

RAMP GRADE: -7%

RAMP LENGTH: 325 FT

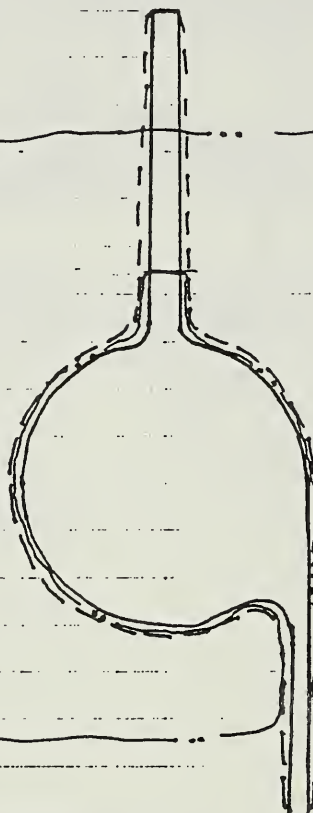
RAMP WIDTH: 24 FT

PAD ELEV: +15 FT

PAD GRADE: 0%

PAD DIAMETER: 300 FT

MACLEOD HARBOR

MLLW  
0.00MHHW  
11.0

PAD AND RAMP CONSTRUCTION: \$192,400 (28,337cy)

ESTIMATED COST = \$192,400

ROAD: COST INCLUDED WITH  
ACCESS LINK

STEEL RAILS TO INSTALL IN RAMP FOR SLIDE NOT INCLUDED  
WITH COSTS, THEY (3 RAILS OR TUBES) TO BE BROUGHT IN  
WITH THE OPERATOR.

FIGURE 2-1

1-11-89

LTF, MACLEOD HARBOR, SOUTH SIDE  
RAMP-SLIDE FACILITY

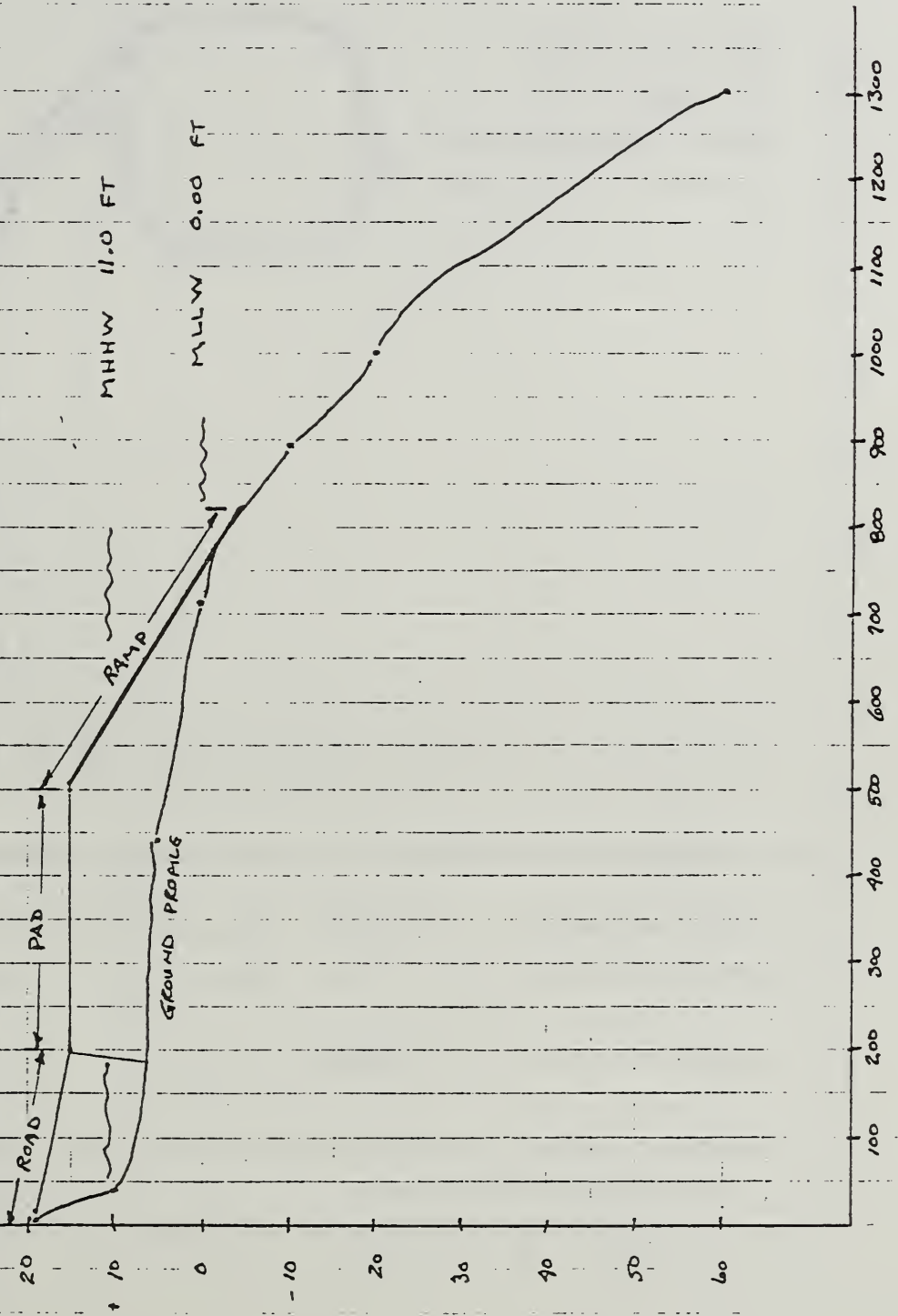


FIGURE 2-2

SAM GRIMES

1-11-89

LTF, MACLEOD HARBOR SOUTH SIDE  
A-FRAME FACILITY

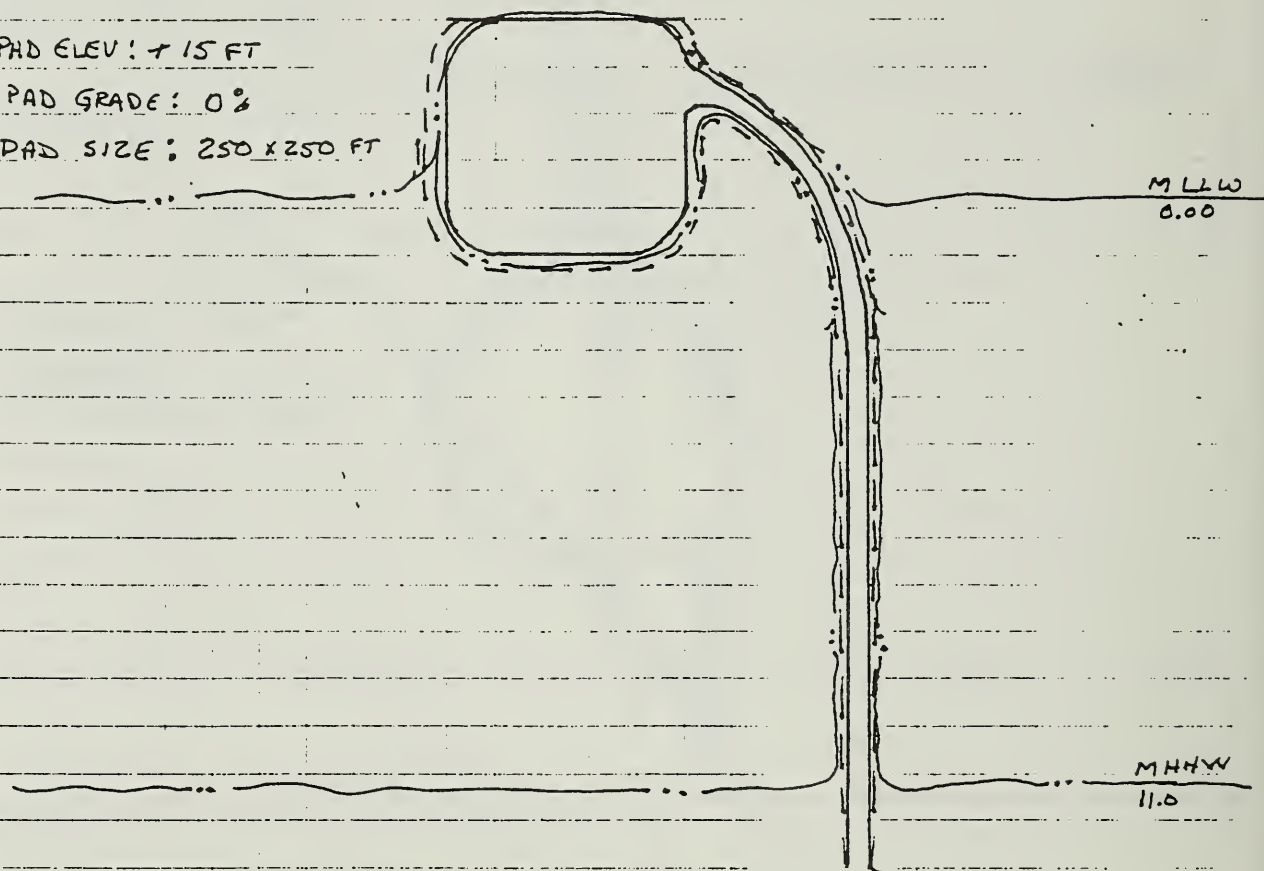
FACE DEPTH: -10 FT

MACLEOD HARBOR

PAD ELEV: +15 FT

PAD GRADE: 0%

PAD SIZE: 250 X 250 FT



PAD CONSTRUCTION : \$ 32,390 (46,000 cy) ROAD : COST INCLUDED WITH  
 SHUT PILE FACE = \$ 9,400 (250 FT) ACCESS LINK

ESTIMATED COST : \$ 321,740

LIFT-OFF A-FRAME NOT INCLUDED WITH COST, SINCE ITS BROUGHT  
 IN WITH THE OPERATOR.

FIGURE 2-3



4 4  
SAM GRIMES  
1-11-89

LTF, MACLEOD HARBOR SOUTH SIDE  
A-FRAME FACILITY

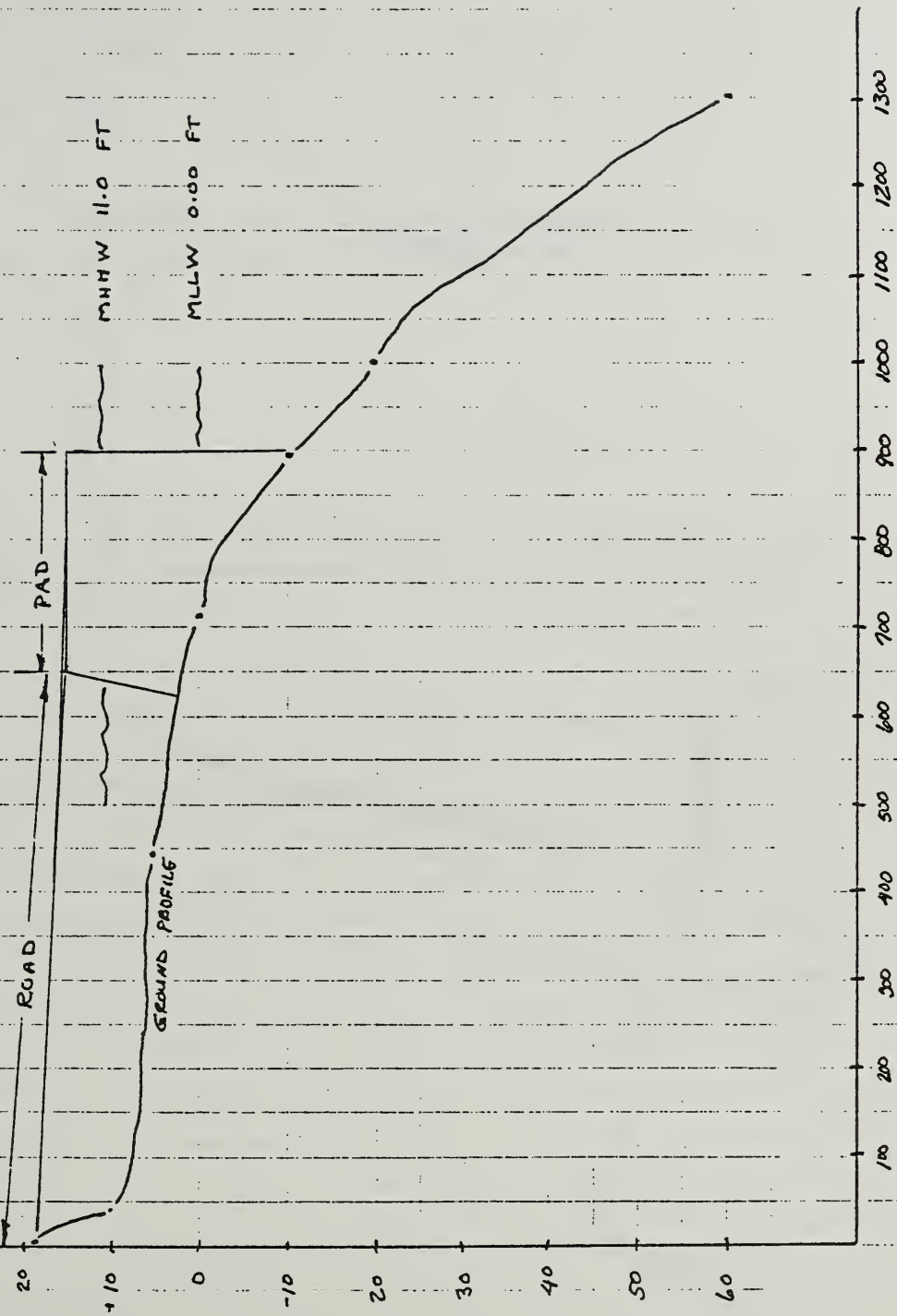


FIGURE 2-4

LTF, WOODED ISLAND

SAM GRIMES

2-2-89

PATTON BAY

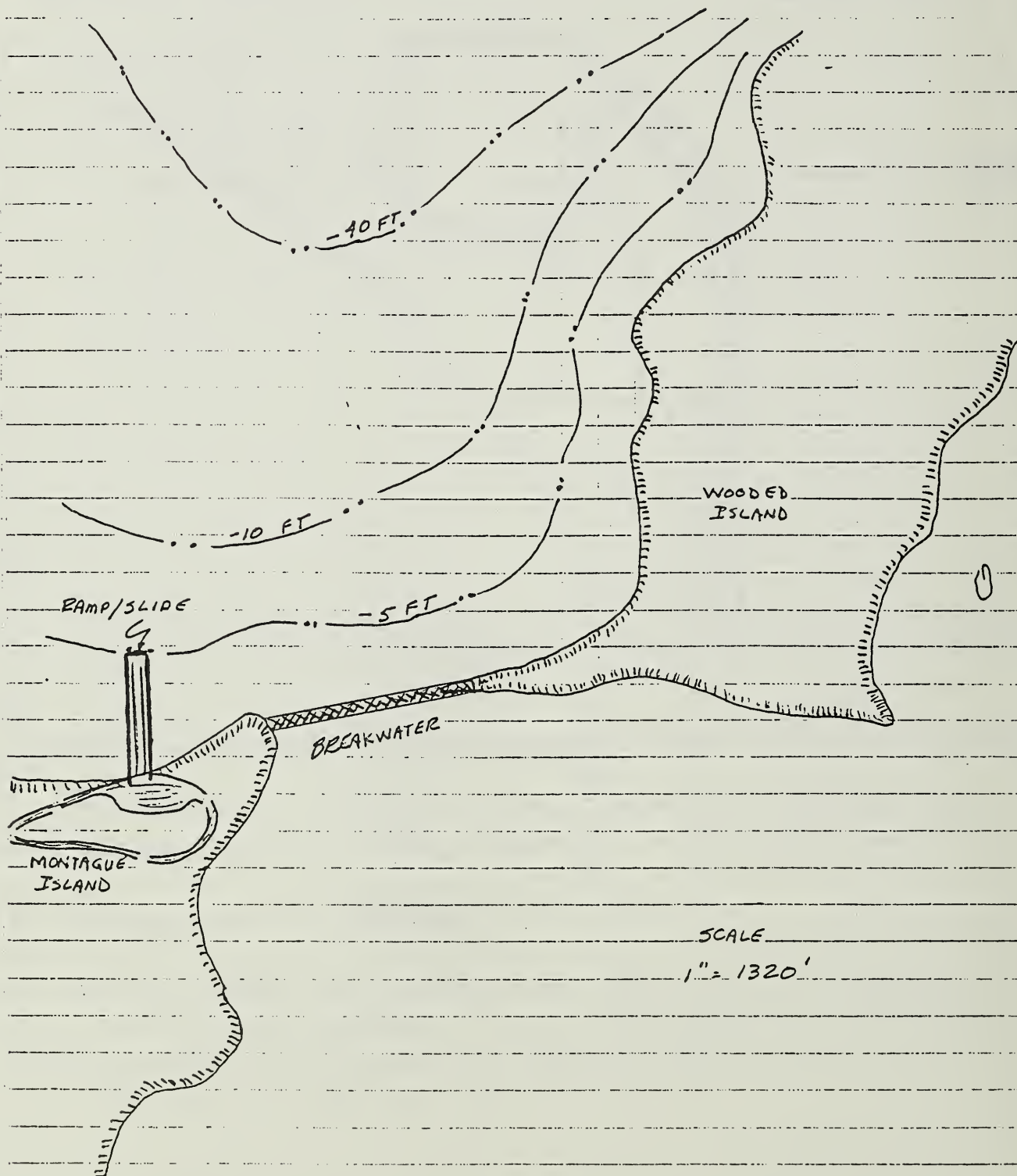


FIGURE 3-1

2-2-89

LTF, WOODED ISLAND

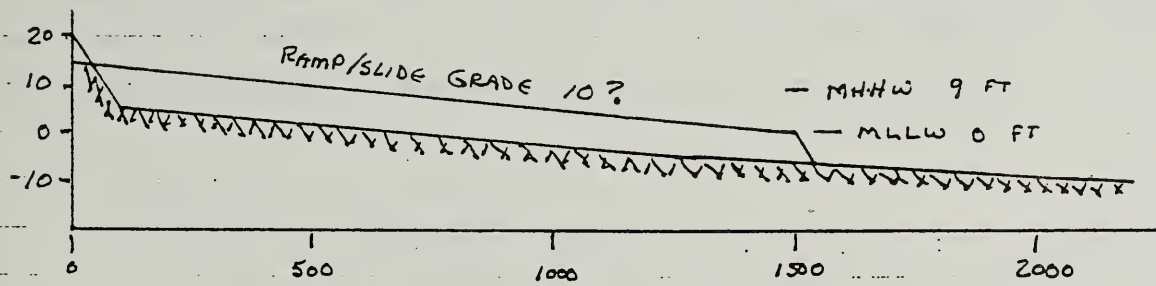
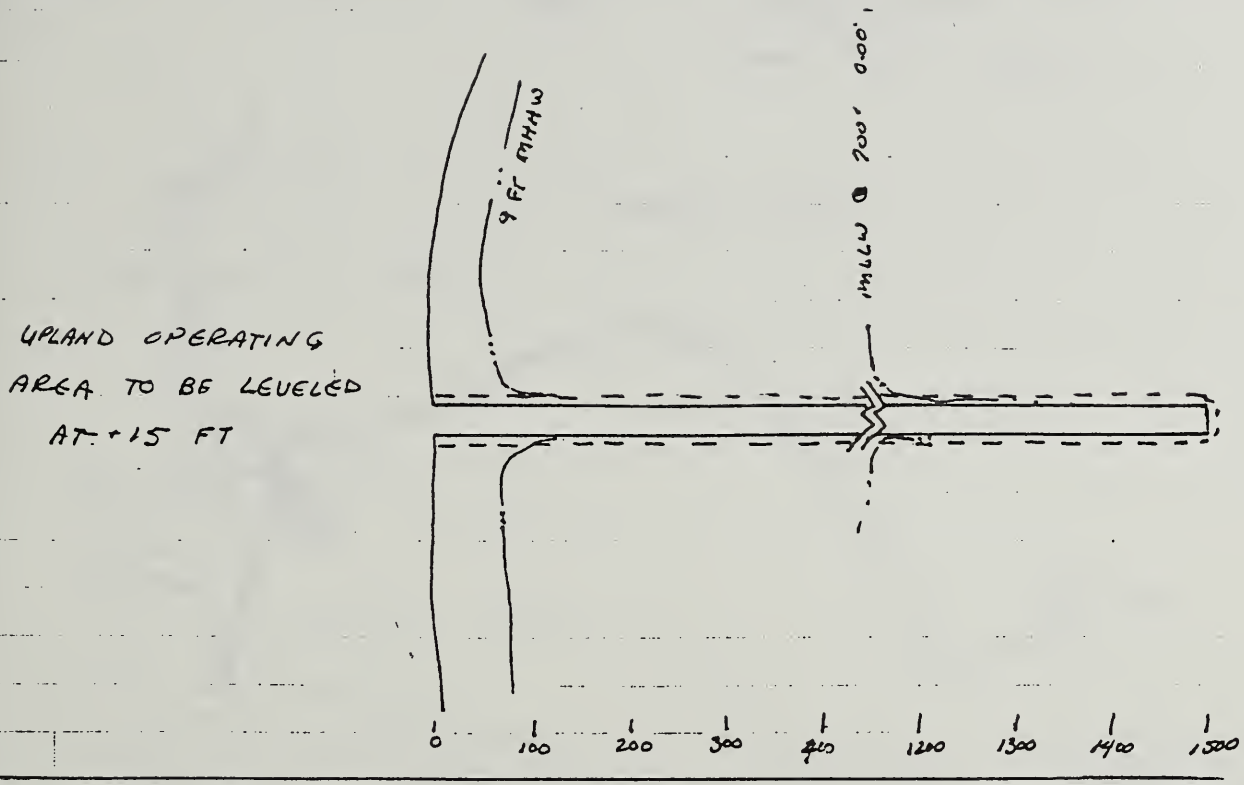


FIGURE 3-2



LTF, Box Point

SAM GRIMES

2-3-89

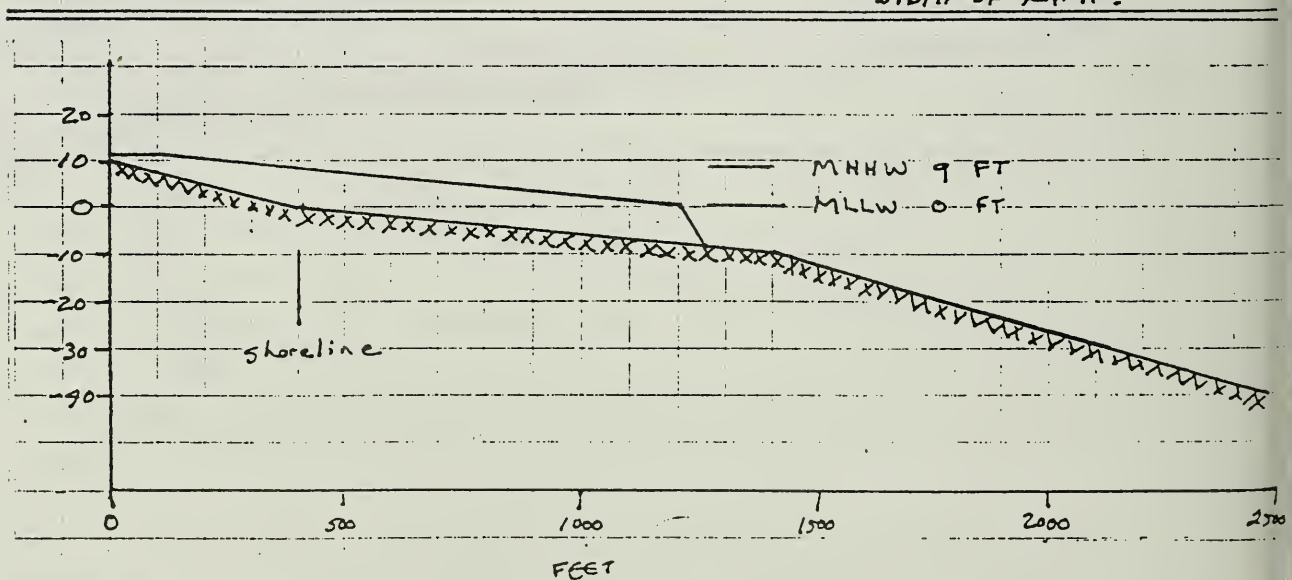
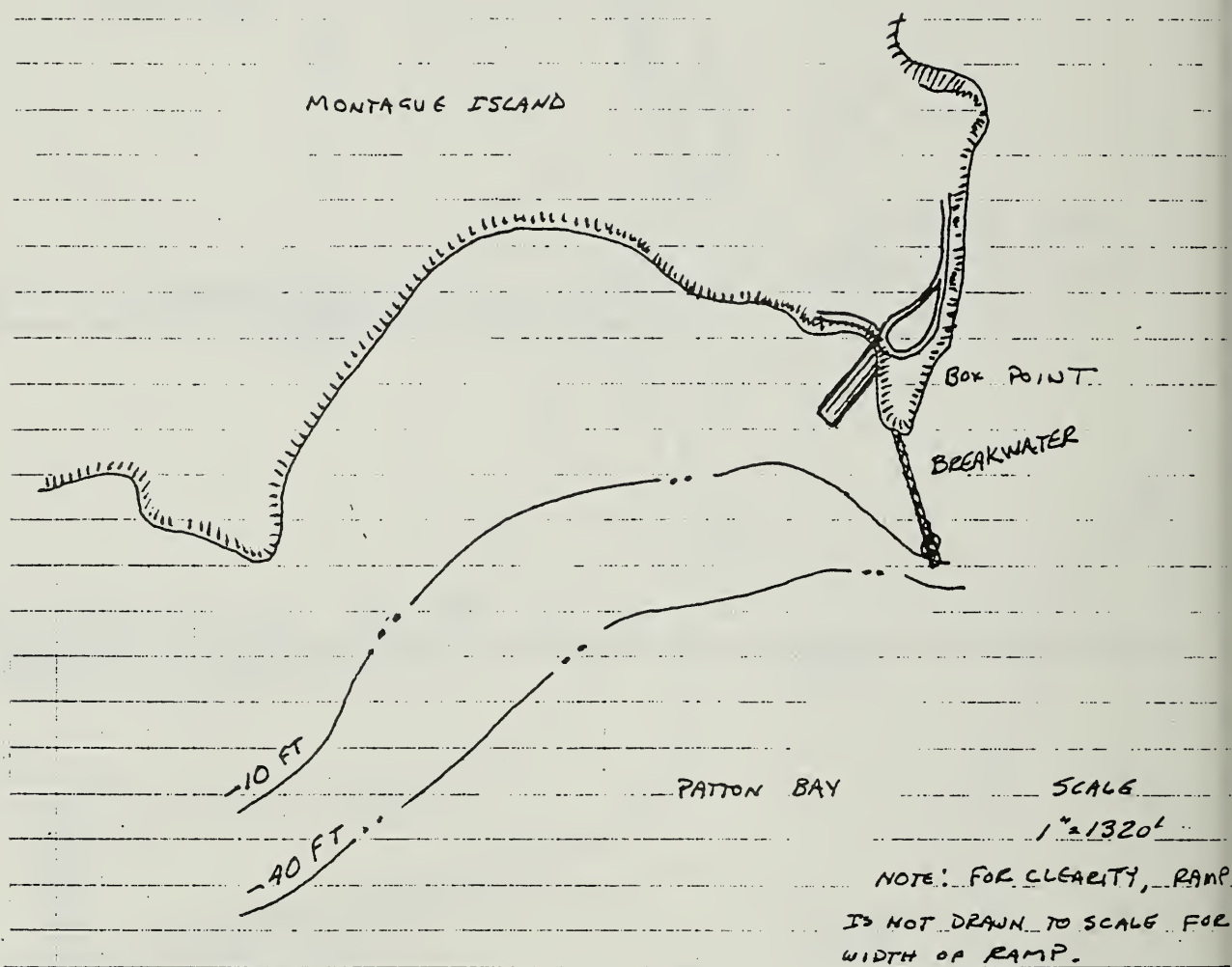


FIGURE 4



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
P.O. Box 1668  
Juneau, Alaska 99802

September 22, 1986

Mr. Paul Tweiten  
Chugach Alaska Corporation  
3000 A Street  
Suite 400  
Anchorage, Alaska 99503

Dear Mr. Tweiten:

Enclosed please find the site investigation of potential log transfer facilities on Montague Island, conducted by the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service during June of this year. We appreciate your support in this effort which avoided the usual logistical nightmare of conducting SCUBA investigations at remote sites. We hope the report and recommendations will assist in your planning efforts. Please contact our Habitat Conservation Division in the Anchorage Field Office at 271-5006 should you have any questions regarding this report.

Sincerely,

*Theodore F. Meyers*  
Theodore F. Meyers, Chief  
Habitat Conservation Division

cc: FWS, Anchorage  
ADF&G, Juneau, Anchorage  
EPA Juneau, Anchorage  
Forest Service, Chugach



Log Transfer Facility - Preliminary Site Investigation  
MacLeod Harbor, Montague Island  
June 24-25, 1986

Introduction:

In response to a request from the Chugach Alaska Corporation (Chugach), a team of biologist/divers from the Alaska Department of Fish and Game, U.S. Fish and Wildlife Service, and National Marine Fisheries Service conducted a preliminary field investigation of potential log transfer facilities (LTF) at MacLeod Harbor, Montague Island, Alaska. Chugach owns approximately 14,000 acres of land on the south and east sides of Montague Island and plans to cut 150 million board feet (MMBF) of timber over a 7 to 10 year period. The U.S. Forest Service also has plans to log Montague Island, and anticipates cutting a maximum of 36 MMBF beginning in 1992. Chugach is working with the U.S. Forest Service to consolidate facilities.

A joint sort yard and transfer site are planned. Potential LTF sites exist in both Patton Bay on the east side of Montague Island and in MacLeod Harbor to the west (Fig. 1). The Patton Bay site is exposed to substantial wind/wave action, and Chugach does not feel it is as feasible a location as MacLeod Harbor. Initial investigations, therefore, are confined to the latter area.

A 28-31 mile logging road would be constructed between cutting areas near Patton Bay and MacLeod Harbor. At MacLeod Harbor a campsite of approximately 50 people, sort yard, LTF, and log storage areas would be constructed (Fig 2). The agency review team considered several potential LTF sites and associated facilities (log storage areas, sort yards, roads, and drainage control facilities) on the north and south shorelines of MacLeod Harbor. A series of minus tides facilitated investigation of the intertidal regions, while SCUBA was used for subtidal work.

General Observations:

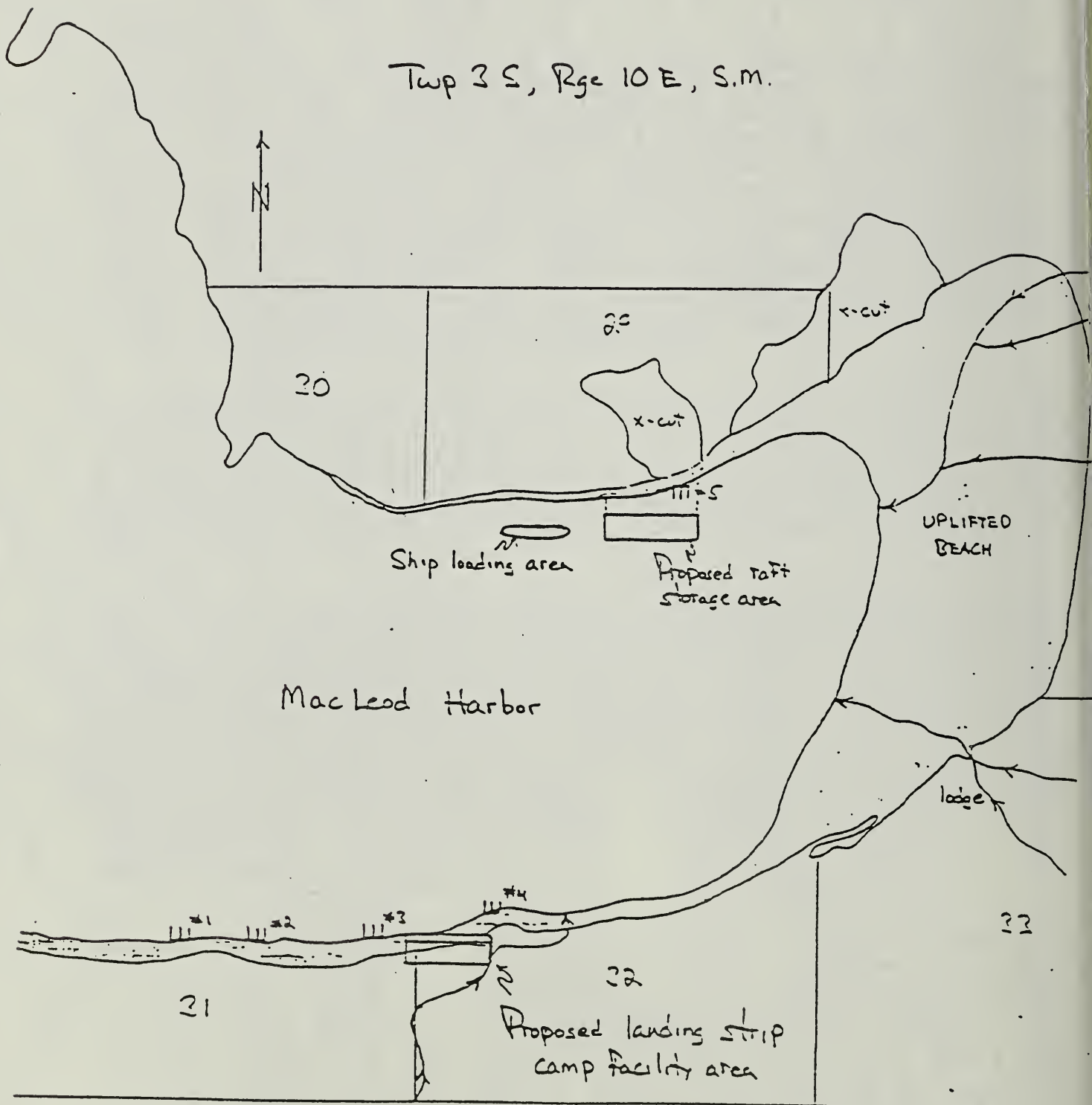
Four potential sites were initially identified on the south shore of MacLeod Harbor (Fig. 2). The two outermost sites, sites numbered 1 and 2, were deemed marginal because of exposure to wind/wave action, and subtidal transects were not conducted. Sites 3 and 4 afforded better wind/wave protection and had more useable adjacent upland; therefore, these were considered further. Following examination of the intertidal region of the entire south beach and subtidal examination of site 3, the interagency team concluded the differences between sites 3 and 4 would be minimal. This conclusion is based on the homogeneous nature of the intertidal and subtidal substrate, the small distance between sites 3 and 4, and the general paucity of macroflora and macrofauna on the south shore.





# MONTAGUE ISLAND

Twp 3 S, Rge 10 E, S.M.



W - Terminal Transfer Facility Alternatives

↗ - Stream

≡ - Uplifted Beach, 1964 Earthquake

x-cut - 1975 Harvest Unit

Scale: 1 inch = approx. 2000 ft



The entire south shoreline of MacLeod Harbor consists of a very wide, low-profile beach (approximately 4 percent slope) uplifted during the 1964 earthquake. The intertidal zone was composed of firm sands with occasional intrusions of small gravels. Coarser substrates are found towards the mouth of the harbor. The only intertidal vegetation consisted of a small patch of rockweed (Fucus sp.) attached to a rock outcropping near site 1. No kelps were observed along the southern shore.

Due to the similarity of sites 3 and 4, only one subtidal transect was conducted (at site 3). It commenced at the estimated zero tide line (MLLW) and carried seaward for 300 feet. The substrate was homogenous sand. Attached flora and fauna were sparse (Fig. 3). Most organisms observed were motile species such as jellyfish, starry flounder, and hermit crabs. Personnel from a nearby lodge have found razor clams in this vicinity. Several live clam siphons were observed by the interagency review team in depths of 20-30 feet of water between 150-200 feet from the mean lower low water mark.

Site 5 is on the north shore of MacLeod Harbor at a location previously used as an LTF during a 1975 harvesting operation (Fig. 2). The intertidal area graded between 3-12 inch diameter rock. Subtidal transects were conducted off the old LTF face (Fig. 4) and near a proposed in-water storage site, approximately 400 feet to the west (Fig. 5). The sites display similar depth profiles and community structure characteristic of many shorelines in Prince William Sound. A broad Fucus/Balanus zone extends from the intertidal to approximately -3 feet (MLLW). Below this, the kelp Laminaria dominated to approximately 30 feet in depth. Substrates were predominately composed of fine sands and silt below 10 feet. No bark was observed at this site, although some cable and other old logging debris occurred. The sea floor sloped steeply in this area, reaching a depth of -51 feet near the end of the transect. Several juvenile Tanner crabs (Chionoecetes bairdi) were observed at 40-45 foot depths at the western-most site.

#### Discussion/ Recommendations

In evaluating the feasibility of potential LTF sites, many factors are considered. These factors include biological criteria such as intertidal and subtidal resources, algal beds, important fish, shellfish, or invertebrate resources or habitat, important commercial, sport, or subsistence fishing areas, proximity to anadromous fish streams, and the location of any bald eagle nests. Abiotic factors considered include the distance of the LTF to deep water, the slope and substrate at the site, exposure to wind and wave action, the degree of existing impacts, site access impacts, and other technical requirements such as adequate area for construction of sort yards, storage areas, and drainage control/sediment basin structures. The Governors Timber Task force has adopted such



Figure 3.

SITE 3

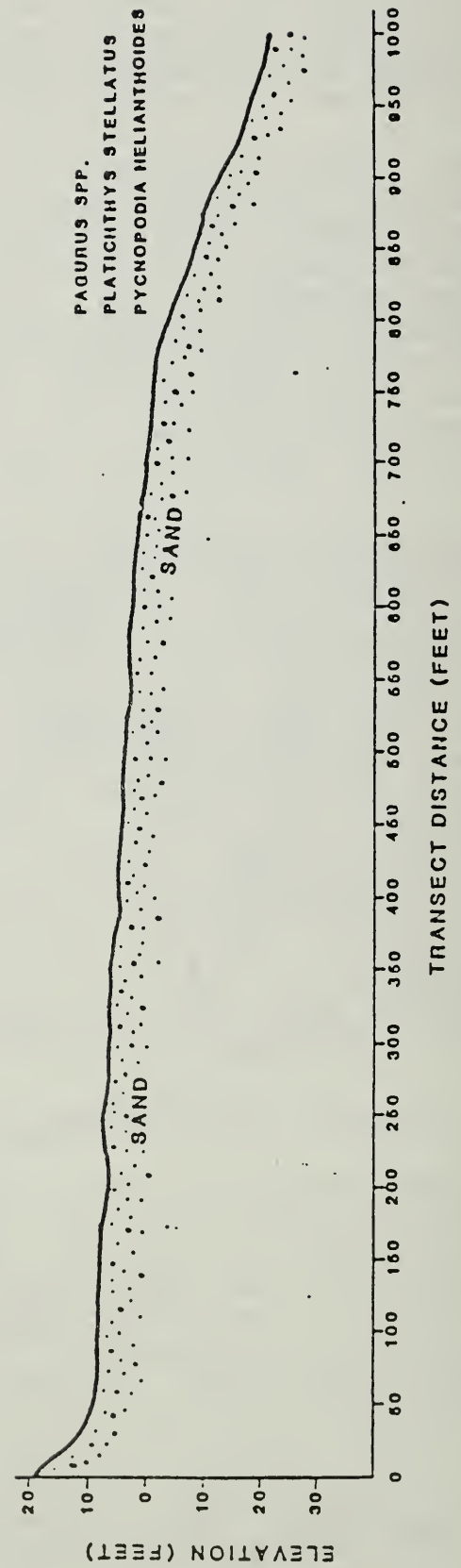


Figure 4.

SITE 5

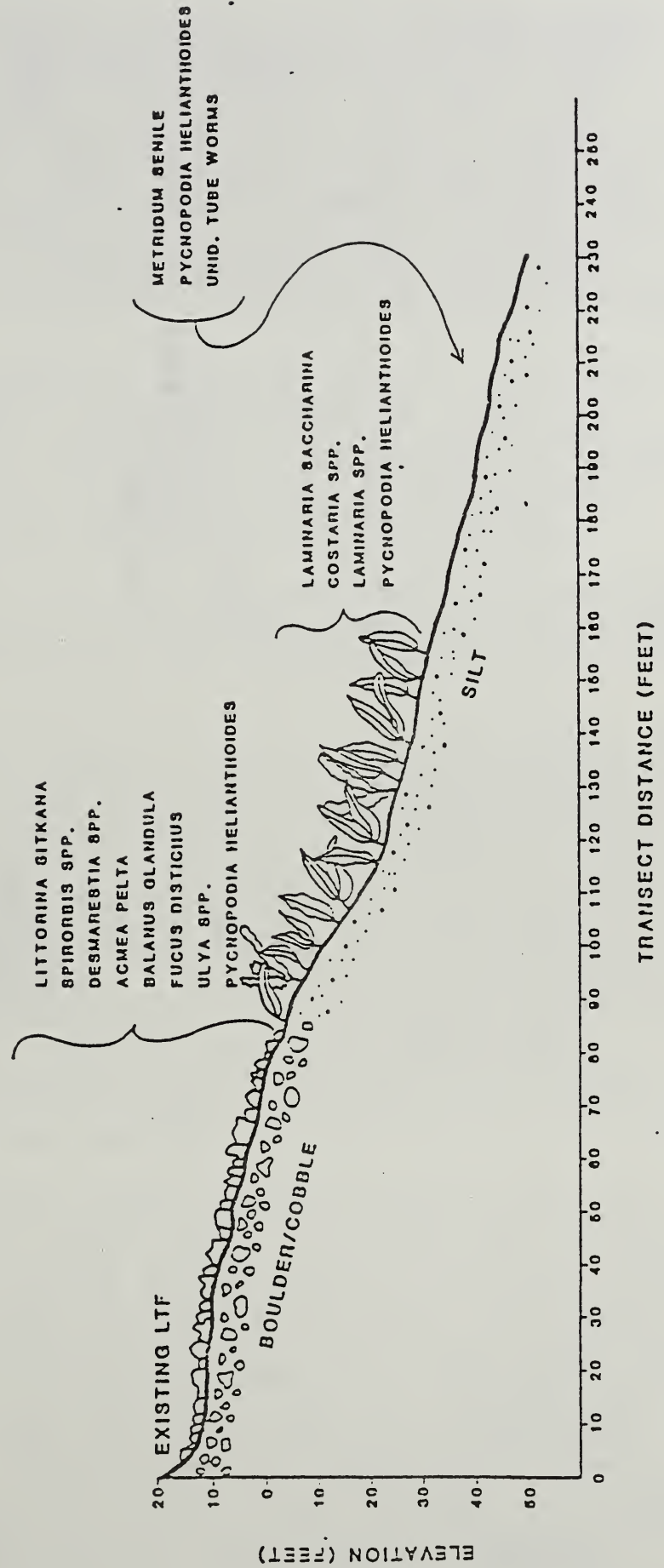
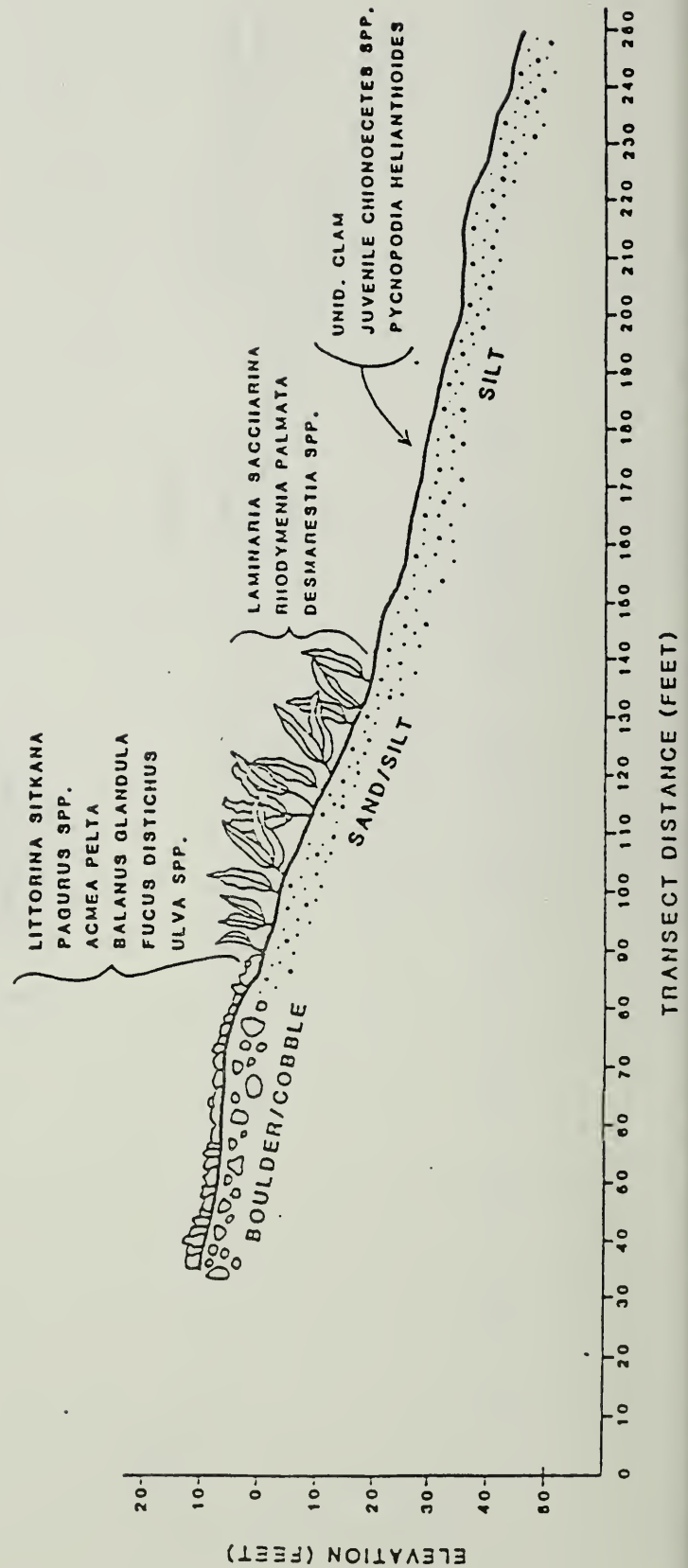


Figure 5.  
LOG STORAGE AREA  
NEAR SITE 5





criteria in their Log Transfer Facility Siting, Construction, Operation, and Monitoring/Reporting Guidelines of the Timber Task Force, October 21, 1985. These guidelines note that specific stipulations may be necessary for individual sites. However, a review of these guidelines is a logical "first cut" in the selection process. These guidelines also provide for construction and operational controls to reduce environmental impact. The state and federal agencies are particularly concerned with bark control, surface drainage, and monitoring efforts. Chugach should carefully review these criteria prior to final site selection.

Use of the Task Force Guidelines indicates sites 1 and 2 are infeasible, primarily due to wind/wave exposure. They are farther than sites 3 and 4 from useable upland areas, and would conflict with existing commercial fish harvests near the mouth of MacLeod Harbor; hence, we recommend they be dropped from further consideration. The remaining sites are feasible.

Sites 3, 4, and 5 are all located near the mouths of pink salmon spawning streams (Figs. 6 and 7). Stream number 227-10-17020, near site 3, has less production than stream number 227-10-2011 near site 5.

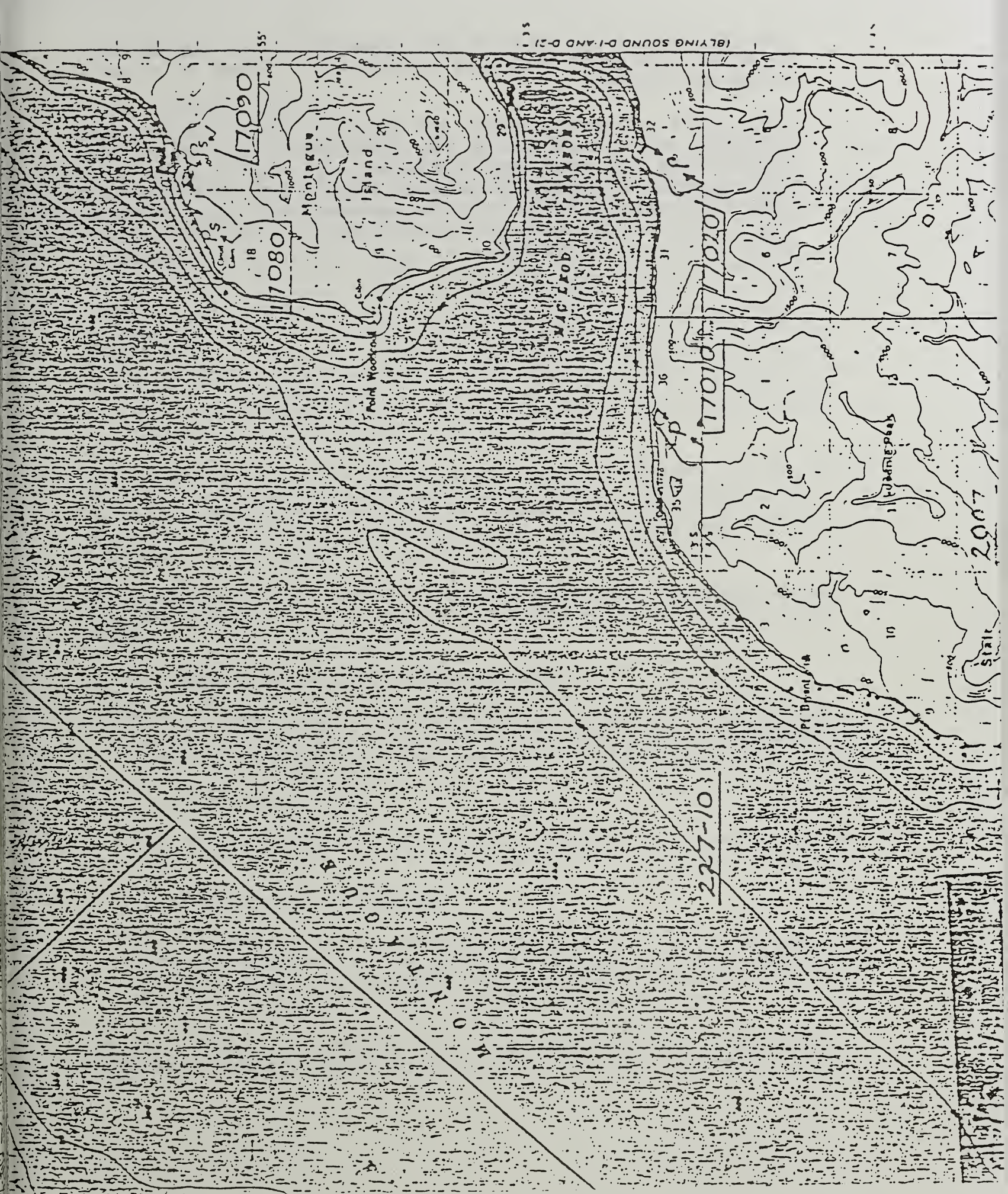
The main biological advantage to site 3 or 4 is the paucity of macrobiota in the zone of immediate impact. Other advantages include large areas of adjacent uplands which would allow development of log storage/sort yard sites with perimeter drainage ditches and settling basins for water quality control. Disadvantages include the large amount of fill required to construct a bulkhead in adequate water depths and a relatively greater exposure to wind/wave action. This latter factor is important for safety/operational purposes. Currents on the south shore would tend to spread bark/wood debris over extensive areas of this broad, sloping beach. Erosion may be an additional problem. Local lodge personnel stated that the entire south shoreline of MacLeod Harbor is subject to significant shifting of substrate over short time periods.

Site 5 is the most protected (from wind/wave action) of all proposed sites. Adequate upland areas for storage/sort yards are available, and the distance to deep water is much less than all other sites. These factors are presumably the prime reasons site 5 was previously chosen for an LTF location. One disadvantage is that marine vegetation and associated fauna are more abundant here. However, considering the total area potentially affected by LTFs at each proposed site, and the previous use of site 5, the interagency team concludes this is the preferred site of those examined. Transfer methods which do not involve the placement of logs into the water are preferable to in-water methods. It is important to emphasize that preliminary investigations of the interagency team are restricted to relative comparisons of proposed sites only. Thus they cannot determine











the (biologically) best of all possible sites for an LTF. Moreover, relative rankings necessarily change as sites are added or deleted.

Joint (U.S. Forest Service and Chugach Alaska Corporation) planning and use of an LTF for Montague Island is obviously prudent for all concerned entities. In the interest of minimizing total effects, the Alaska Department of Fish and Game, U.S. Fish and Wildlife Service and National Marine Fisheries Service encourage continuation of such action and welcome the opportunity to participate as planning efforts proceed.

## ROAD MANAGEMENT OBJECTIVE

The cumulation of the planned access opportunities in each alternative is a set of proposed road projects for implementation based on a selection of alternative actions. Through the planning process, a management strategy was envisioned as the road proposals developed. This management strategy is called a Road Management Objective (RMO).

Road Management Objectives (RMOs) are written for each road planned for inclusion into the Forest's Forest Development Road (FDR) system. RMOs are approved by the District Ranger, but are included in the environmental statement as advisory information to the District Ranger. Our interested public will also be able to find out, in advance of construction, how the Forest Service intends to manage an individual road. Though the Forest Service is not a public roading agency, it is our goal to provide road access for multiple uses whenever it can be done safely for the user and the activity is not damaging to the environment or its eco-systems.

RMOs, once approved by the District Ranger, are the management guidelines for the District implementation and maintenance programs. As time goes by, conditions may change the management strategy for the road. The District Ranger can, at any time, approve changes or totally modify RMOs and is encouraged to periodically review the RMOs.

A RMO package for each road in the alternatives follows has been prepared. Each RMO package contains three forms which are described by their titles below.

### 1. Road Management Prescription Worksheet

This worksheet contains the information to be recorded in the Forest Service road data base, Transportation Information System, resources use levels, maintenance responsibilities and road objectives and limitations.

### 2. Road Design Standards

This records elements for the location, design, and construction of the road. The greatest use of this form will be for the design of a road.

### 3. Road Management Objectives

Here is where the management strategy is displayed. It deals specifically with road management and the individual resource management opportunities and constraints. The management intent is spelled out and the need for specialist coordination that is expected for the field work.

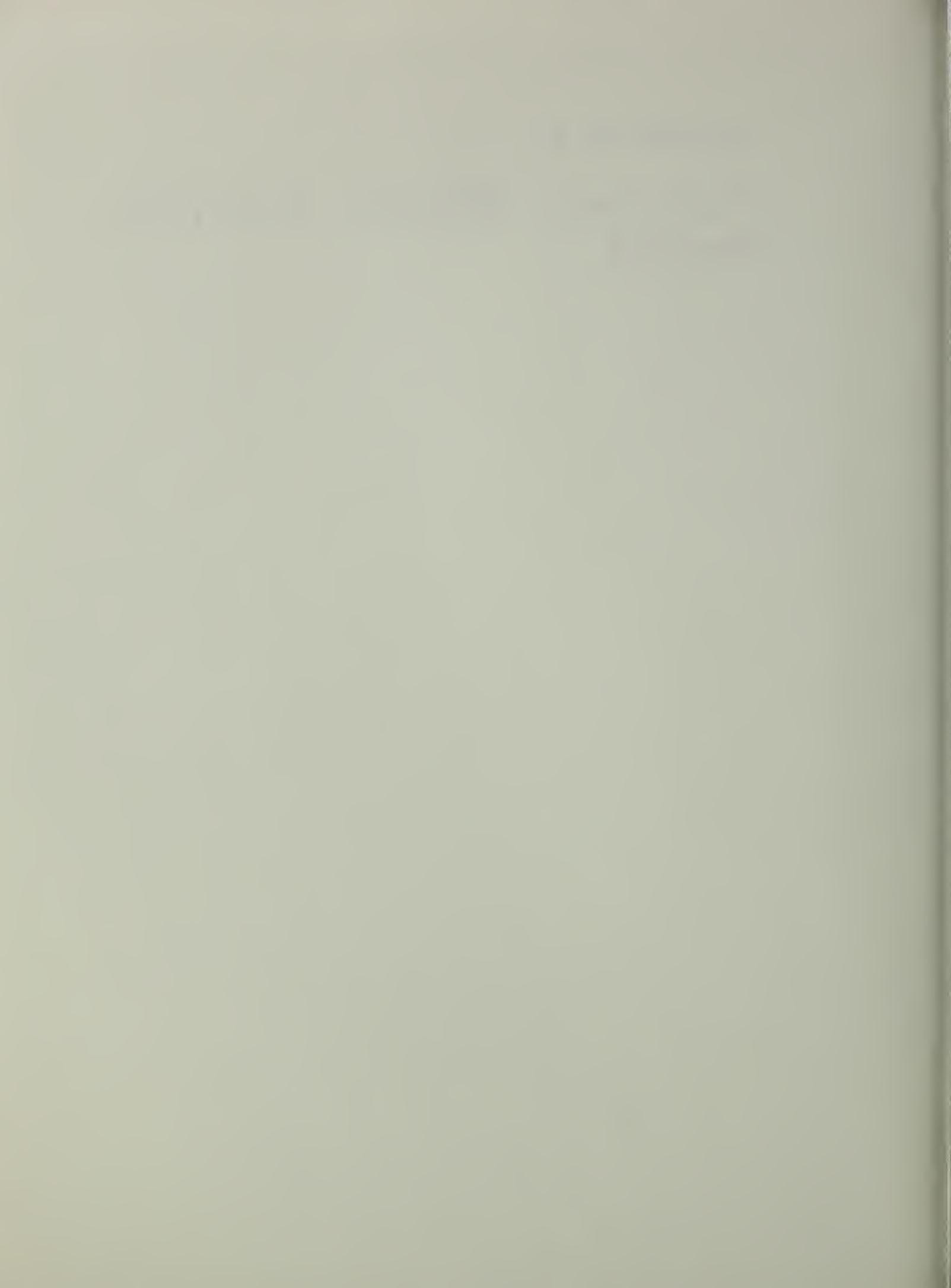
The Draft RMOs may be reviewed during normal business hours at the Forest Supervisor's Office, Chugach National Forest, 201 E 9th, Anchorage, Alaska.





## **Appendix E**

# **Fisheries Effects Analysis Process**



## FISHERIES EFFECTS ANALYSIS PROCESS

### Introduction

Timber harvest can impact fish habitat by increasing stream sedimentation, altering water temperatures, reducing streambank and stream channel stability, and changing instream and streamside cover. The magnitude of these impacts are directly related to the individual harvest unit and road locations and designs, the management practices used to implement the project and the intensity of harvest within the watershed.

For the purpose of this analysis, fish habitat is defined as that portion of any stream that is classified as either a B,C,D, or E channel type. A complete description of these channel types can be obtained from the Supervisor's Office of the Chugach National Forest. These channel types produce all of the salmon and the vast majority of cutthroat trout and Dolly Varden char within the Big Islands Management Area. This method actually overestimates the amount of fish habitat available because several of the B channel types are actually too steep to support fish populations.

The A channel types are small headwater streams which are generally too steep to support significant populations of either anadromous or resident fish. These streams are assumed not to be fish habitat.

Because of their importance, the analysis specifically emphasizes impacts to anadromous habitat, including water quality impacts. Impacts to resident sportfish habitat are not analyzed separately because, with the exception of isolated lakes, the majority of these populations are in the same stream systems as the anadromous fisheries and the impacts would be expected to be similar to those for anadromous habitat.

Ten parameters will be used to evaluate alternatives. They include: A) the relative importance of individual fish streams; B) the total miles of proposed harvest near streams; C) the miles of proposed harvest near streams within stream habitat zones (SHZ); D) the acres of proposed harvest within a watershed; E) the acres of proposed harvest within stream habitat zones (SHZ); F) the total miles of proposed road construction; G) the miles of proposed road construction within SHZ; H) the total number of proposed stream crossings; I) the number of proposed road crossings within SHZ; and J) a site-specific subjective rating of the potential for impacts to aquatic habitat for each harvest unit.

#### A. Relative Importance of Fish Streams

Each stream in the Big Islands Management Area is important in contributing to the cumulative wild stock salmon production, in maintaining stock diversity, and in supplementing production when individual streams have poor production because of variable biological or climatological factors. Several stream systems appear to be especially important because they produce a disproportionately high number of pink or chum salmon; because they provide exceptional sportfishing opportunities, or because they have



had fisheries habitat enhancement projects completed within the watershed.

To focus management attention on the most important stream systems, each fish stream within the management area is placed in one of three categories based on 1) the average pink and/or chum salmon escapements over a 20 year period, 2) the sportfishing potential of the system, 3) the presence or absence of fisheries enhancement projects, and 4) whether or not the stream was an ADF&G index stream.

Priority 1 streams (Very High Importance) within the Big Islands Management Area are shown in Table 1. They include all streams which meet one or more of the following criteria:

1. The stream provided an average of at least 1% of the estimated Prince William Sound wild stock production of pink and/ or chum salmon for either even or odd years between 1966 and 1987.
2. The stream provides significant sportfishing opportunities.
3. A large structural fisheries habitat improvement project has been developed within the stream system.

Priority 2 streams (High Importance) include all ADF&G index streams which are not designated as Priority 1 streams. Salmon escapement is annually monitored on index streams in Prince William Sound by ADF&G. Index streams provide the majority of the salmon produced. Priority 2 streams in the Big Islands Management area are shown in Table 2.

Priority 3 streams (Low-Moderate Importance) include cataloged anadromous fish streams which are not designated as either Priority 1 or Priority 2 streams as well as any streams which are suspected of having anadromous or high value resident fish habitat, but which are not yet documented.

To allow an evaluation of proposed management activities, this analysis displays the impacts for Priority 1,2 & 3 streams separately. Much of the evaluation is based on cumulative totals for each group. Because of their importance, Priority 1 streams are evaluated individually to determine potential impacts to individual watersheds.

Table 1. Priority 1 Streams in the Big Islands Management Area.

| <u>Stream Name</u>  | <u>Stream #</u> | <u>Selection criteria*</u> | <u>On Forest</u> |
|---|-----------------|----------------------------|------------------|
| <u>Montague District (Montague and Green Islands)</u>           |                 |                            |                  |
| San Juan R.   | 17000           | 2                          | X                |
| Quadra Cr.  | 17110           | 1                          | X                |
| Swamp Cr.   | 17390           | 1                          | X                |
| Chalmers R.   | 17410           | 2                          | X                |
| Cabin Cr.   | 17470           | 1                          | X                |
| Rocky Cr.   | 17590           | 3                          | X                |
| Beach River   | 17780           | 2                          | X                |
| Nellie Martin R.  | 17790           | 2                          | X                |
| Stump Lake  | 17820           | 2                          | X                |
| <u>Southeastern District (Hawkins and Hinchinbrook Islands)</u> |                 |                            |                  |
| Boswell R.  | 10050           | 3                          | X                |
| Nuchek Cr.  | 18120           | 1                          | X                |
| Constantine Cr.   | 18150           | 1                          | X                |
| Shelter Bay Cr.   | 18210           | 2                          | X                |
| Anderson Cr.  | 18280           | 1                          | X                |
| Double Cr.  | 18310           | 1                          | X                |
| Honker Cr.  | 18340           | 1                          | X                |
| Cutoff Cr.  | 18350           | 1                          | X                |
| Makaka Cr.  | 18440           | 2                          | X                |
| Hawkins Cr  | 18470+18460     | 1                          | X                |
| Canoe Pass Cr.  | 18520           | 3                          | X                |
| Windy Cr.   | 18610           | 1                          |                  |

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\* 1 = Provided at least 1% of Prince William Sound Pink and Chum wild stock production for either even or odd years between 1966 and 1987.

2 = Important sportfishing.

3 = Presence of large structural fisheries enhancement project.

Table 2. Priority 2 Streams in the Big Islands Management Area

| <u>Stream Name</u>        | <u>Stream #</u> | <u>On Forest Land</u> |
|---------------------------|-----------------|-----------------------|
| <u>Montague District</u>  |                 |                       |
| Point Cr.                 | 17020           | X                     |
| Clam Beach Cr.            | 17030           | X                     |
| MacLeod Cr.               | 17070           |                       |
| Hanning Cr.               | 17100           | X                     |
| ---                       | 17170           | X                     |
| ---                       | 17180           | X                     |
| ---                       | 17190           | X                     |
| ---                       | 17220           | X                     |
| ---                       | 17240           | X                     |
| ---                       | 17250           | X                     |
| Montegue Cr.              | 17260           | X                     |
| Russel Cr.                | 17380           | X                     |
| Kelez Cr.                 | 17400           | X                     |
| Wilby Cr.                 | 17440           |                       |
| Wild Cr.                  | 17450           |                       |
| Schman Cr.                | 17460           |                       |
| Gilmour Cr.               | 17480           | X                     |
| Shad Cr.                  | 17490           | X                     |
| Stockdale Cr.             | 17520           | X                     |
| Dry Cr.                   | 17540           | X                     |
| Udall Cr.                 | 17700           | X                     |
| McKeran Cr.               | 17710           | X                     |
| Rosswog Cr.               | 17740           | X                     |
| Pautzke Cr.               | 17750           | X                     |
| Green Cr.                 | 17880           | X                     |
| <u>Southeast District</u> |                 |                       |
| ---                       | 18050           | X                     |
| Etches Cr.                | 18060           |                       |
| Beaver Cr.                | 18070           |                       |
| Garden Cr.                | 18100           |                       |
| ---                       | 18110           | X                     |
| Deer Cr.                  | 18170           | X                     |
| Juania Cr.                | 18180           | X                     |
| Eagle Cr.                 | 18270           | X                     |
| Bear Cr.                  | 18290           | X                     |
| Bates Cr.                 | 18330           | X                     |
| Dans Cr.                  | 18360           | X                     |
| Goose Cr.                 | 18390           | X                     |
| Rollins Cr.               | 18490           |                       |
| Zillesenoff Cr.           | 18510           |                       |
| West Lagoon Cr.           | 18560           |                       |
| East Lagoon Cr.           | 18570           |                       |
| North Lagoon Cr.          | 18580           |                       |
| Clamdiggers Cr.           | 18620           |                       |

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#### B. Miles of Timber Harvest Near Streams

Streamside timber stands stabilize the streambanks, moderate stream flows and temperature, provide inputs of large organic debris and organic nutrients, and support insects and other forms of fish food. Harvesting these stands may reduce streambank stability, increase stream flows during flood events, increase stream temperature during summer, decrease temperature during winter, increase sedimentation, and remove future sources of large woody debris.

The total miles of proposed timber harvest near all streams within the project area (including A channels) is an indication of the potential to reduce water quality on a watershed level for each of the alternatives. Because this parameter includes all streams, rather than just designated fish streams, this is not the best indicator of potential impact to fish habitat.

Big Islands Management Standards and Guidelines for timber harvest within riparian areas set minimum widths for Aquatic Habitat Management Units (AHMU) along all streams. The widths of the AHMU and the level of timber harvest allowed varies depending on the channel type of the stream (Appendix F). Actual harvest to the streambank will be rare. The total miles of harvest near streams displayed is equal to the sum of the miles of harvest near each side of the stream.

#### C. Miles of Timber Harvest Near Anadromous Fish Streams

The miles of proposed timber harvest near anadromous fish streams within the project area provides a better indication of relative potential to adversely impact fish habitat than the miles of proposed timber harvest near all streams.

#### D. Acres of Timber Harvest within a Watershed

The acres of proposed timber harvest within a watershed provides a relative index of the potential to impact water quality in the watershed. Because fish habitat is not distributed evenly throughout the watershed, this is not the most reliable indicator of impacts specifically to fish habitat.

#### E. Acres of Timber Harvest Within The Stream Habitat Zone

Within the project area, there are numerous small tributaries which contain anadromous fish habitat, but which have not been documented and cannot be identified on planning maps. These tributaries can support large populations of coho fry and are often more productive than the main stream. Because of their small size, they are also generally more susceptible to impacts from timber harvest.

Stream habitat zones (SHZ) were developed as an analysis tool to identify the general areas where there is a high likelihood of encountering anadromous habitat, including the small braided channels important to coho fry. The SHZ contains the main stem channels and lakes as well as the adjacent low gradient stream areas. The majority of the anadromous habitat is found within these zones, however, they may also contain areas with no

fish habitat. Potential adverse impacts to fish habitat are assumed to be proportional to the acres harvested with the SHZ.

SHZ were defined using a combination of stream channel type and landform information. They include all designated fish streams ( all B,C,D, and E channel types and associated lakes) and adjacent landforms. Of the 23 landtypes which were used to describe landforms in the Big Islands area, 4 landtypes were used to develop the SHZ. These include: Alluvial Fans Landtype (81), Low Outwash Plains Landtype (82), Braided Streams Landtype (83), and High Outwash Plains Landtype (89). These four categories appeared to include the majority of the high quality freshwater fish habitat. Reports are available from the Supervisor's Office of the Chugach National Forest describing the various landtypes in the Management Area.

Stream Habitat Zones were created by combining all of the 81, 82, 83, and 89 landtypes adjacent to any B, C, D, or E channels or associated lakes. Where the designated landforms did not lie immediately adjacent, a 100 foot strip on each side of the stream and associated lakes was also included in the SHZ. The SHZ for many streams was simply the 100' strip on each side of the stream.

F. Total Miles of Forest Road Development

Forest road development and runoff from roads can introduce sediment into stream systems. If this sediment accumulates in a streamcourse it may reduce fish production by decreasing spawning success, eliminating rearing area, and altering the food base in the stream system. The magnitude of impacts from road development is correlated to road density and road use, but it also depends on a variety of factors such as stream gradient, stream size, runoff patterns, and construction techniques.

The total miles of road development is calculated for each alternative to give a relative indication of the potential impact which may occur throughout the project area.

G. Miles of Roding within the Stream Habitat Zone

The miles of road development proposed within the stream habitat zones provides a better representation of the potential impacts to fish habitat than total road development within the watershed.

H. Number of Stream Crossings

The adverse impacts of road development on fish habitat are related to the number of stream crossings and the resulting sedimentation.

I. Number of Stream Crossings within the Stream Habitat Zone

Stream crossings within the Stream Habitat Zone create the potential to adversely effect fish habitat because sediment is directly introduced into fish habitat. Unavoidable habitat losses also occur each time a culvert is placed into a fish stream.

J. Ratings of Individual Timber Harvest Units

To estimate site specific impacts on fish habitat, each harvest unit was rated on its potential to adversely affect fisheries resources. Ratings were assigned by District and Forest biologists, ranged from 0 (low ) to 4 (high). The criteria for these rankings are included in Table 3.



Table 3.  
Rating of Potential Adverse Effects of  
Timber Harvest Units on Fish Habitat

| <u>SCALE</u> | <u>Effect</u> | <u>CRITERIA</u>   |
|--------------|---------------|---|
| 0            | None          | <ul style="list-style-type: none"> <li>-- No identified fish streams in unit</li> <li>-- The unit is not within the SHZ</li> <li>-- No expected impacts to fish habitat</li> </ul>  |
| 1            | Low           | <ul style="list-style-type: none"> <li>-- Minimal harvest near streamsides within unit</li> <li>-- Minor amount of harvest proposed within the SHZ</li> <li>-- No braided channels within unit, slide hazard areas or roads with major stream crossings</li> </ul>  |
| 2            | Low-Moderate  | <ul style="list-style-type: none"> <li>-- Moderate harvest near streamsides</li> <li>-- Moderate harvest in SHZ</li> <li>-- Some proposed harvest near both sides of minor streams</li> </ul>   |
| 3            | Moderate-High | <ul style="list-style-type: none"> <li>-- High potential for impacts due to harvest near streamsides or within the SHZ</li> <li>-- Timber harvest near both sides of major streams</li> <li>-- Harvest near braided channels</li> <li>-- Many small rearing streams within unit</li> <li>-- The proposed unit would affect areas of unstable soils</li> <li>-- Very high fish habitat values within the unit</li> <li>-- High risk of impacting anadromous fish habitat</li> <li>-- High potential for long term impacts to fish habitat</li> </ul> |
| 4            | High          | <ul style="list-style-type: none"> <li>-- Same criteria for 3 except for:</li> <li>-- Timber harvest activities would result in or contribute to the long term instability of fish habitat</li> <li>-- Standard mitigation measures are not feasible or would not adequately protect fish habitat</li> <li>-- Significant potential for long term impacts to fish habitat</li> </ul>  |

## **Appendix F**

# **Management Areawide Standards and Guidelines**





## BIG ISLAND MANAGEMENT AREAWIDE STANDARDS AND GUIDELINES

RESOURCE: Cultural Resources

Activity: Cultural Resource Activities NAS Code: AC

### I. General Direction - Project Clearance/Inventory

- A. Project Clearance: Any project, activity, or program that can result in changes in the character or use of historic properties shall be considered an undertaking and would require evaluation through inventory and survey. The following procedures would be taken when implementing an undertaking to ensure close cultural resources coordination and monitoring throughout the compliance process.

#### Standards and Guidelines

1. No undertaking will proceed until consultation requirements have been completed and cultural resources clearance has been approved by the appropriate line officer.
  2. Any undertaking that is not in compliance with 36 CFR 800 will be suspended until it is brought into compliance.
  3. In each project area, prior to implementation, cultural resource sites will be marked for protection. Consult the Cultural Resource Handbook.
  4. If a previously undiscovered site is found during the course of a project, the project administrator will halt any work that might potentially damage the site and immediately consult the State Historic Preservation Officer. Work may not resume until consultation has been completed.
  5. Include in each contract, permit or lease a statement of the operating conditions required to protect cultural resources in or adjacent to the project area, and a clause addressing responsibility to protect sites and liability for damage.
  6. Protect all cultural properties until a formal "Determination of Eligibility" for the National Register of Historic Places has been determined in consultation with the State Historic Preservation Officer.
- B. Intensive survey is required for compliance ("project clearance"). Intensive inspection means systematic pedestrian examination of the surface, and subsurface examination where necessary to ensure that the goal of the survey ("project clearance") is accomplished.

### Standards and Guidelines

1. All surveys should be guided by an explicit research design. If a research design is not used, the reason(s) should be documented in the survey report.
  2. Cultural resource surveys will be designed, supervised, and evaluated by a professional archaeologist, anthropologist, or historian.
- C. Projects that do not have the potential to affect cultural resources and are not under the direct or indirect jurisdiction of the Forest Service are not considered undertakings and may be excluded from survey; consult the Forest Archaeologist. In questionable cases, the Forest Archaeologist will recommend to the Forest Supervisor that the State Historic Preservation Officer be consulted. The following activities will not normally require intensive survey, unless known sites are involved:

### Standards and Guidelines

1. Emergency actions taken to protect life or property are not considered undertakings subject to immediate consultation. Consult 36 CFR 78.
2. Activities that involve less than one square meter (11 square feet) of cumulative ground disturbance, unless in known sites.
3. Tenant-type maintenance of administrative sites, provided that such a site is not on or eligible for the National Register of Historic Places.
4. Activities taking place on glacial ice and permanent snowfields.
5. Routine road and trail maintenance in previously surveyed areas, which does not involve disturbance of new ground areas (except in known sites).
6. Non-discretionary, congressionally-mandated land exchanges.
7. Conveyances excuted under the authority of the Alaska Native Claims Settlement Act of 1971 (P.L. 920203) and the Alaska Statehood Act of 1958 (P.L. 85-508)
8. Activities where previous natural or human disturbance has modified the landscape so extensively that the likelihood of finding cultural resources is negligible (for example, vertical expansion of existing pits).

9. Maintenance, reconstruction, or replacement of existing facilities in areas which have already received archaeological clearance or which does not entail additional ground disturbance (for example, fish ladders, bridges, culverts, fences, cabins, or features of developed recreation sites).
  10. Resource maintenance activities involving no surface disturbance sufficient to expose mineral soil (for example, TSI by hand or precommercial thinning by hand; associated campsites are excluded).
- D. Inventory: Develop a comprehensive compilation of known cultural resources information in overview form which describes the location, description, status, and other management data for all project clearance and non-project surveys.

#### Standards and Guidelines

1. Include a compilation of areas that have been surveyed.
2. Include a discussion and map of areas assigned to the cultural resource sensitivity zones.
3. Include a discussion of the area's environmental and cultural histories.
4. Identify gaps in existing data and provide recommendations for future research.
5. Develop management direction.
6. Include a comprehensive bibliography.
7. Inventory of project specific areas would be completed during the planning process to ensure compliance with existing regulation.
8. Inventory standards are determined from direction contained within the FSM 2300, and formalized in a research design in consultation with the State Historic Preservation Officer.
9. Inventory the area of an undertaking's potential effect for cultural resources and of Native American religious use and traditional cultural significance.
10. Develop and maintain an inventory of sites identified by Native Americans to have religious or traditional significance in consultation with Native Americans.



- E. Evaluate all cultural resources on National Forest lands. The following is the recommended order of priority.

Standards and Guidelines

1. Properties that may be adversely affected by proposed land management activities.
2. Properties undergoing deterioration due to vandalism, public use, erosion, or other forces.
3. Properties of known significance that have been identified but not previously evaluated.
4. Other cultural resource properties.

II. General Direction - Monitoring

- A. Initiate a monitoring program that would document cultural site condition, interpretation potential, and restoration and stabilization needs. Utilize compiled monitoring data to develop or test predictive models, determine the effectiveness of mitigation measures, and provide information for the preparation of the WO Annual Report on the condition of National Register eligible sites and the actions taken to ensure their preservation.

Standards and Guidelines

1. Frequency of inspection would include a minimum of one documented visit per selected site per year.
    - a. If site damage is observed additional inspections may become necessary. If an area is damaged through suspected human disturbance, other sites in that vicinity should also be inspected (consult the Forest Archaeologist and/or Special Agent).
  2. Coordinate the monitoring plan with District Rangers, the Forest Archaeologist and the Special Agent.
- B. Monitoring procedures would include observations documenting the current site condition. The monitoring of a site would be documented through a signed, written report that verifies which site was inspected and the observed condition.
- C. Prioritize cultural sites to be monitored on a yearly basis as coordinated by the Forest Ranger, Forest Archaeologist, and Special Agent utilizing the same criteria as identified for evaluation.

RESOURCE: Recreation

Activity: Recreation Resource Planning

NAS code: AN 112

I. General Direction - General Recreation

- A. Increase and enhance a variety of recreation opportunities with an emphasis on making the management area more accessible and usable. Provide opportunities for both the highly qualified, outdoor enthusiast and the less well prepared or knowledgeable visitors.
- B. The Recreation Opportunity Spectrum (ROS) describes the setting and experience expected for the entire management area and displays on the ground recreation objectives.
- C. Recognize the significance of existing recreation uses such as hunting, fishing, beach combing, camping and boating. Maintain highly attractive recreation settings that continue these uses.

Standards and Guidelines

- 1. Develop a system of marine recreation areas that are compatible with the State's marine park system.
  - 2. Improve access by constructing roads, trails, providing boating facilities and improving airstrips where practical.
  - 3. Continue to allow aircraft and power boat use.
  - 4. Length of stay at undeveloped sites would be limited to 14 nights.
  - 5. Close areas to off-road vehicle travel to maintain high quality non-motorized recreation opportunities and eliminate impacts on sensitive ecosystems.
- D. Recognize the need to provide new recreation opportunities and expand existing opportunities. Encourage the development of those activities that are consistent with natural resource based recreation. Expand opportunities for:
- 1. Freshwater fishing
  - 2. Wildlife viewing and nature study
  - 3. Hiking
  - 4. Saltwater boating (kayaking, sailing, and power boating)
  - 5. Interpretation of natural or cultural resources
  - 6. Use of beaches and alpine areas

7. Loop travel routes (roads, trails, and water routes)
8. Motor vehicle travel and parking (on and off road use)
9. Camping (a spectrum of opportunities)
10. Back country biking
11. Winter uses beyond what currently exist, and
12. Other recreation activities that result from new technology or changes in recreation use patterns.

#### Standards and Guidelines

1. Develop a system of anchorages suitable for recreation boats which helps provide access to recreation attractions.
  2. Provide other appropriate facilities to meet recreation needs (i.e. boating, camping, cabins, interpretive/information, hiking, parking, etc.).
  3. Cooperate with affected communities, user groups and private or public partners when implementing scheduled recreation projects.
  4. Locate and design recreation facilities to minimize the adverse effects on fish, wildlife, and other resources including visual resources. Consult the National Forest Landscape Management System, Volume 2, Chapters 1 (handbook 462) and 8 (handbook 666).
- E. Increase the participation of private sector partners in the provision of recreation opportunities. Encourage all forms of partnerships that achieve the overall goals for the management area.

#### Standards and Guidelines

Identify sites and activities where joint or cooperative development or management through partnerships is desirable.

- F. Recreation opportunities provided on National Forest System land would be in concert with, and supplement, those opportunities which are located on lands of other ownership or jurisdiction. Generally, recreation areas, sites, and facilities located on National Forest lands should:

#### Standards and Guidelines

Complement, rather than duplicate, commercial public services (i.e. resorts, marinas, lodges, stores) within nearby communities or on private or other public land in the



vicinity. However, if needed public services are not being provided on private or other public lands, provide or encourage others to provide these services and/or facilities.

- G. Ensure that recreation opportunities are integrated into all resource programs. During project planning for timber, fisheries and other resource activities consider public recreation needs including interpretive services.

Activity: Recreation Use Administration

NAS code: AN 122

I. General Direction - Outfitter/Guide Operations

- A. Encourage outfitter and guide operations which provide services that help customers use, enjoy, understand, and appreciate their National Forest.
- B. Manage outfitter and guide operations as partnerships with the Forest Service.
- C. Provide the public with information regarding outfitters, guides and other commercial services in brochures, maps, recreation opportunity guides and other media. Cooperate with permittees when developing public information and share costs when possible.
- D. Administer outfitter and guide special use permits in accordance with the direction in FSM 2340 and 2720.

Standards and Guidelines

- 1. Outfitting and guide operations should not require permanent improvements occupying National Forest System lands.
- 2. Authorize outfitter/guide operations on the basis of the following criteria:
  - a. Balance guided and outfitted and general public use.
  - b. Ensure that the affected ecosystem(s) have the capability to accommodate the expected kinds of activities and amounts of use.
  - c. Ensure that there is a public need for the services to be offered and that the services would enhance the objectives of the Management Area.
  - d. Where competitive interest exists, issue a prospectus to solicit proposals. Select the proposal that provides the best public service.
  - e. Avoid adversely impacting other special use permit operations and popular or highly valued use areas.

- f. Operations and activities must be appropriate for the specific recreation opportunity spectrum settings.
  - g. Operations must be carried out in a manner that is compatible with the existing or expected use by the general public and would not constitute de facto exclusive use areas.
  - h. Party size and distribution of groups should be appropriate for the activities and recreation setting. Generally consider maximum party size of 4 for primitive ROS settings, and 12 for semi-primitive settings. Larger group size may be authorized where it is desirable to have a higher guide/client ratio or where impacts on other user groups are not anticipated. There is no limitation on party size for other ROS settings.
  - i. Solicit advice from appropriate State agencies for operations that affect fish and wildlife populations. Utilize State licensing information if available when authorizing permits.
3. Provide outfitting and guide operations through the issuance of priority use permits whenever possible, supplemented with temporary permits. Assign priority use and temporary use permits based on the following criteria:
- a. Normally, allocate approximately one-quarter of the total capacity of recreation use (in a specific area) to outfitter/guide operations. The limiting factor is that the outfitter/guide allocation should not result in defacto "exclusive use" areas.
  - b. Priority user permit would be assigned to outfitters that have demonstrated 3 years of satisfactory performance.
  - c. Prior to assigning priority use the total carrying capacity of the area should be established. Carrying capacity should be established for specific activities.
4. Include the following criteria when issuing permits that authorize tent platforms:
- a. Platforms would not be located in sensitive visual zones or within 100 feet of active streams, rivers, lakes or beach front to insure aesthetics and quality recreational opportunities for other forest users.
  - b. Avoid locating at heads of bays, grass flats, and more attractive public use areas that are traditionally used or have a high potential for general public use.

- c. Earth-tone, natural colors are required for tents.
  - d. Avoid locating immediately adjacent to salmon streams where human-bear confrontations may occur or in other important wildlife habitat areas.
  - e. All platform designs must be approved prior to construction.
  - f. Clean up bonds should be required to ensure sites are clean at the end of the use season unless previous performance indicates that a bond is not necessary.
  - g. Platforms would be removed for non-use periods of 30 days or more.
  - h. A letter of non-objection should be obtained if the proposed sites have been selected by Native corporations or the State of Alaska.
- E. Enforce outfitter/guide permitting policies by monitoring and fully cooperating with State and local authorities and user organizations.

## II. General Direction - Interpretive Services

- A. Assist forest visitors in understanding the role of natural and cultural resources in the development of the heritage, culture and industry in Southcentral Alaska. Relate these roles to the rest of the State and the Nation.
- B. Inform visitors of the various roles of the Federal, State, and private lands found in the area and the range of recreation and cultural interest opportunities and facilities available.
- C. Promote visitor understanding of the National Forest System by emphasizing the stewardship of public lands and their productivity through professional multiple-use resource management.
- D. Provide visibility for the Forest Service mission and image at all Forest Service facilities.

## III. General Direction - Recreation Settings

- A. Provide a broad spectrum of outdoor recreation opportunities in accordance with the inherent capabilities of the National Forest.
- B. In areas where other resource management activities are given precedence, manage to continue providing the inherent recreation settings and opportunities until scheduled activities and practices cause a change in the ROS setting.



- C. In locations where scheduled activities change the recreation setting, manage the new setting in accordance with appropriate ROS guidelines. Maintain the capability of all areas to provide appropriate quality recreation opportunities on a sustained basis.
- D. Manage recreation use and activities to meet the appropriate levels of social encounters, on-site development, and visitor impacts indicated for the associated ROS settings.
- E. Manage recreation resource activities and facilities in accordance with the established Regional guidelines. All recreation planning and management activities would address the following critical elements of the recreation setting:
  - 1. Visual Characteristics
  - 2. Access
  - 3. Remoteness
  - 4. Visitor Management
  - 5. On-Site Development
  - 6. Social Encounters
  - 7. Visitor Impacts

Activity: Trail Administration

NAS Code: AT12

I. General Direction - Trail Administration and Maintenance

- A. Maintain an inventory of existing trails which would assist in determining the desirability of retaining trails in their current location, their contribution in meeting overall recreation objectives, and actions needed to bring the trails up to desired standards, and to maintain those standards. Consult Forest Service Handbook 2309.18, Trail Management Handbook and Standard Specifications for Construction of Trails, EM 7720-102.
- B. Construct, reconstruct and maintain trails and waterway facilities as part of the Forest transportation system.

Standards and Guidelines

- 1. Prioritize and schedule trail construction, reconstruction and maintenance to meet public needs as follows:
  - a. Existing trails and waterways serving local community needs, regional recreation needs and tourist centers.

- b. Existing trails and waterways providing access to recreation facilities.
  - c. New trails and waterways which would serve local communities, regional recreation needs, tourist centers and resorts.
  - d. New trails which would disperse use and are needed to help protect resources from degradation.
- C. Maintain trails to a level that meets the public need with an emphasis on safety and reducing resource damage.

## DESCRIPTION OF ROS CLASSES

Rural recreation opportunities are usually within 1/2 mile of heavily traveled roads and/or waterways; or receive heavy aircraft travel. Provide access to recreation activity opportunities and facilities within the area. Adopted visual quality objectives do not exceed Maximum Modification, but are primarily Partial Retention or Modification in the foreground of sites and travel routes. Some facilities such as visitor centers may be elaborate and designed for large groups of people.

Roaded Natural recreation opportunities are usually within 1/2 mile of moderate to heavily traveled waterways and/or roads which are maintained to Levels 3 and 4 and open for use by the public; or receive heavy small aircraft travel or motorized boat use. Provide access to recreation activity opportunities and facilities within the area. Adopted visual management objectives do not exceed Modification, but are primarily Retention, and Partial Retention in the foreground of sites and travel routes.

Roaded Modified recreation opportunities are provided with appropriate facilities within cutover areas with a VQO of Maximum Modification; are accessed by Forest roads which are maintained to Levels 2, 3, and 4; are open for use by the public. Provide parking and camping facilities to enhance the use of recreation vehicles, fisherman parking, trailheads and ATV use of local nearby roads.

Semi-primitive Motorized recreation opportunities are usually available within 1/2 mile of infrequently travelled waterways, or small aircraft access points; and/or roads which are maintained for passage by high clearance and four-wheeled drive vehicles (Maintenance Level 2), open to public use, and provide access to appropriate recreation opportunities and facilities. Manage such areas to provide for low to moderate numbers of encounters with other parties and appropriate solitude at campsites.

Semi-primitive Nonmotorized recreation opportunities are usually available in all areas more than 1/2 mile away from infrequently travelled waterways, or roads and trails open to motorized recreation use, and clearcut areas. Aircraft access is only occasional.

Primitive (formerly PII) recreation opportunities are usually available in all areas that meet the remoteness criteria for the Primitive ROS setting.

Pristine (formerly PI) recreation opportunities are provided in selected areas that meet the remoteness criteria for the Primitive ROS setting, and provide essentially unaltered wildland ecosystems, and have non-motorized access.

Use the following ROS charts in project planning and analysis as guidelines to establish appropriate levels of use, scale and kinds of facilities, visual quality objectives, types of access and services to meet local and Regional needs and desired recreation setting conditions.



## LEGEND FOR ROS SETTING INDICATORS CHARTS

FULLY COMPATIBLE - Conditions that meet or exceed the norm.

NORM ----- Normal conditions found in the setting.

UNACCEPTABLE ----- Unacceptable conditions under any circumstances for a given setting.

### FACILITY DEVELOPMENT SCALE

1. Minimum site modification. Rustic/rudimentary improvements for site protection only.
2. Little site modification. Rustic/rudimentary improvements for site protection and some comfort for user. On-land motorized access with some traffic controls.
3. Moderate site modification. Facilities equally for resource protection and user comfort.  
Contemporary/rustic design of facilities.  
Interpretive services often informal, but on-site.
4. Site heavily modified. Some facilities strictly for user comfort and convenience of user. Roads hard surfaced with obvious traffic controls. High density units/acre.
5. High degree of site modification. Facilities mostly designed for comfort and convenience of user. Flush toilets and electrical hook-ups common. Synthetic materials often used. Formal, sophisticated interpretive facilities available. Site often landscaped with exotic materials.

### PARTY SIZE

Typical independent party consists of 3-4 people traveling as a social group. Guided or organization groups are typically larger.

### SITE HARDENING

Site hardening (such as paving, extensive barrier work, etc.) is done to reduce visitor impacts.

ROS CLASS  
RURAL

Setting Conditions 1/

| Setting Indicators                          | NORM/FULLY COMPATIBLE  | UNACCEPTABLE  |
|---|--|---|
| Visual Quality of Non-recreation Activities | Not to exceed Modification in the foreground and Maximum Modification in middle ground as seen from Sensitivity Level I travel routes  | Unacceptable Modification (VQM hdbk.) in foreground or middle ground    |
| Access                                      | All forms of access and travel modes may occur within the Management Area or designated ROS zone   | Lack of Traffic control facilities and signing                          |
| Remoteness                                  | Remoteness is of little importance, and moderate to high concentrations of people and sights and sounds of human activity are acceptable when not of a continuous nature.            | Continuous high levels of use or human caused sounds                    |
| Visitor Management                          | On-site regimentation and controls are obvious. Control facilities harmonize with natural/exotic landscaping. Information facilities may be complex and dominant on developed sites. | Use of inappropriate or hostile traffic control structures or signs     |
| On-site Development                         | All development levels are appropriate and maintained at intended standards necessary to accommodate the types and levels and use anticipated for the site and area                  | Sites which are allowed to deteriorate to unsafe or unsightly condition |

ROS CLASS  
RURAL  
(continued)

Setting Conditions 1/

| Setting Indicators | NORM/FULLY COMPATIBLE  | UNACCEPTABLE   |
|--------------------|--|--|
| Social Encounters  | User may meet more than 20 other parties per day on trails and in dispersed areas. Developed sites often are at full capacity, but do not exceed 20% of the design capacity more than one half the season of operation.                                    | Site and/or area capacities exceeded more than 20% for more than half the season |
| Visitor Impacts    | Visitor caused impacts noticeable, but not degrading to basic resource elements or exceed established visual quality objectives. Site hardening may be dominate, but is in harmony with natural/exotic landscape and appropriate for the site and setting. |  |

1/ Setting Conditions represent R-10 Standards and ANILCA provisions.



ROS CLASS  
ROADED NATURAL

Setting Conditions 1/

| Setting Indicators                          | NORM/FULLY COMPATIBLE  | UNACCEPTABLE   |
|---|--|--|
| Visual Quality of Non-recreation Activities | Not to exceed a visual quality objective of Modification. Existing visual conditions ranging from Preservation through Partial Retention are fully compatible and encouraged.  | Existing visual condition of Maximum Modification  |
| Access                                      | All forms of access and travel modes may occur within the Management Area or designated ROS zone which are compatible with intended activities. Zone of non-motorized use may be established for resource protection & user safety/comfort | Lack of Traffic control facilities and signing   |
| Remoteness                                  | Remoteness of little importance, but low to moderate concentrations of human sights and sounds are preferred.  | Continuous high levels of human use and/or sounds  |
| Visitor Management                          | On-site regimentation and controls are obvious. Control facilities harmonize with the natural environment. Visitor information facilities are not elaborate or complex.  | Highly sophisticated visitor information facilities. Use of military-type control structures |
| On-site Development                         | Facilities and structures generally do not exceed Level IV standards and are maintained at intended standards necessary to accommodate the types and levels of use anticipated for the site and area.                                      | Sites which exceed Level IV  |

ROS CLASS  
ROADED NATURAL  
(continued)

Setting Conditions 1/

| Setting Indicators | NORM/FULLY COMPATIBLE   | UNACCEPTABLE   |
|--------------------|---|--|
| Social Encounters  | User meets less than 20 other parties per day on trails and dispersed areas. Developed sites often are at full capacity but do not exceed 20% of the design capacity more than one half the season of operation.  | Site and/or area capacities exceeded 1/2 the operating season. |
| Visitor Impacts    | Visitor caused impacts noticeable, but not degrading to basic resource elements or exceed established visual quality objectives. Site hardening may be dominate, but is in harmony with natural appearing landscape and appropriate for the site and setting. |  |

1/ Setting Conditions represent R-10 Standards and ANILCA provisions.

ROS CLASS  
ROADED MODIFIED

Setting Conditions 1/

| Setting Indicators                          | NORM/FULLY COMPATIBLE   | UNACCEPTABLE   |
|---|---|--|
| Visual Quality of Non-recreation Activities | Not to exceed a visual quality objective of Maximum Modification. Apply appropriate visual management techniques in the foreground of sensitive travel routes and recreation sites to soften the effects of the maximum modification conditions.                            | Unacceptable Modification existing visual condition anywhere                                 |
| Access                                      | All forms of access and travel modes may occur within the designated ROS zone which are compatible with intended activities. ORV use on designated routes or areas is encouraged.   | Dominating Traffic control facilities and signing  |
| Remoteness                                  | Remoteness from urban conditions and high concentrations of people is important. Low concentrations of human sights and sounds in a back-country roaded setting is preferred.   | Continuous high levels of people or human caused sounds                                      |
| Visitor Management                          | On-site regimentation and controls are few. Control facilities are appropriate for the predominating back-country roaded setting. Visitor information facilities may be used to interpret management activities, but are not elaborate and are appropriate for the setting. | Highly sophisticated visitor information facilities. Use of military-type control structures |
| On-site Development                         | Facilities and structures generally do not exceed Level II standards and are maintained at intended standards necessary to accommodate the types and levels of use anticipated for the site and area.   | Sites which are allowed to deteriorate to unsafe or unsightly condition.                     |



ROS CLASS  
 ROADED MODIFIED  
 (continued)

Setting Conditions 1/

| Setting Indicators | NORM/FULLY COMPATIBLE  | UNACCEPTABLE   |
|--------------------|--|--|
| Social Encounters  | User meets less than 10 other parties per day on trails and dispersed roaded areas. Few, if any, other parties are visible at dispersed campsites.   | Developed site capacities are exceeded more than half the use season |
| Visitor Impacts    | Visitor caused impacts noticeable, but not degrading to basic resource elements. Site hardening may be dominate at campsites and parking areas, but is in harmony with, and appropriate for back-country roaded setting. |  |

1/ Setting Conditions represent R-10 Standards and ANILCA provisions.

ROS CLASS  
SEMI-PRIMITIVE MOTORIZED

Setting Conditions 1/

| Setting Indicators                          | NORM/FULLY COMPATIBLE   | UNACCEPTABLE  |
|---|---|---|
| Visual Quality of Non-recreation Activities | Not to exceed a visual quality objective of Partial Retention. Existing visual conditions ranging from Preservation through Retention are fully compatible and encouraged.  | Any visual condition which exceeds Partial Retention of the characteristic landscape  |
| Access                                      | Travel on motorized trails and TSL 4 roads. Less than 20% of the road mileage within the Management Area or designated ROS zone is TSL 3. Road density is less than one mile per square mile within the Mgmt. Area or zone. Off road snowmachine travel on snow may occur.            | > 20% total area road mileage is TSL 3. > 1 mile/sq. mi. road density.                |
| Remoteness                                  | Nearby sights or sound of human activity is rare, but distant sights or sounds may occur. Setting is located more than 1/2 hour walk or paddle from TSL 3 roads or other high use travel routes. Perception of remoteness is moderate.  | Continuous high levels of people or human caused sounds and travel.                   |
| Visitor Management                          | On-site regimentation and controls are few. Control facilities are appropriate for the predominating natural appearing setting. Visitor information facilities may be used to interpret cultural and natural resource features, but are not elaborate and harmonize with the setting. | Obvious & inappropriate controls & regimentation Sophisticated information facilities |
| On-site Development                         | Facilities and structures generally do not exceed Level II standards and are maintained at intended standards necessary to accommodate the types and levels of use anticipated for the site and area.   | Development Level IV or V sites & facilities  |

ROS CLASS  
SEMI-PRIMITIVE MOTORIZED  
(continued)

Setting Conditions 1/

| Setting Indicators | NORM/FULLY COMPATIBLE   | UNACCEPTABLE  |
|--------------------|---|---|
| Social Encounters  | User meets less than 6-10 parties per day on trails and roads. No other parties are within sight or sound of dispersed campsites. 1-3 other parties within sight or sound of campsites is acceptable only during peak season use.           | Meet > 10 parties/day during trip. >3 other parties at campsites.       |
| Visitor Impacts    | Visitor caused impacts may be noticeable, but not degrading to basic resource elements. Limited site hardening may be used for resource protection, but is in harmony with, and appropriate for the natural appearing back-country setting. | Visitor caused impacts and/or site hardening which dominate the setting |

1/ Setting Conditions represent R-10 Standards and ANILCA provisions.



ROS CLASS  
SEMI-PRIMITIVE NON-MOTORIZED

Setting Conditions 1/

| Setting Indicators                          | NORM/FULLY COMPATIBLE  | UNACCEPTABLE  |
|---|--|---|
| Visual Quality of Non-recreation Activities | Not to exceed a visual quality objective of Retention. An existing visual condition of Preservation is fully compatible and encouraged.  | Any visual condition which exceeds Retention of the characteristic landscape.       |
| Access                                      | Cross-country travel and travel on non-motorized trails within the designated ROS zone. Use of airplanes, helicopters, motorboats and snowmachines for traditional activities, subsistence, emergency search and rescue, and authorized administrative activities may occur unless specifically restricted for safety and/or resource protection purposes. | <u>Other</u> motorized travel <u>within</u> the ROS zone is infrequent              |
| Remoteness                                  | Nearby sights and sounds of human activity is rare, but distant sights or sounds may occur. Setting is located more than 1/2 hour walk or paddle from any road open to public travel (Not including marine travelways).  | Nearby sight or sound of human activity. No perception of remoteness.               |
| Visitor Management                          | On-site regimentation and controls are few. Control facilities are appropriate for the predominating natural appearing setting. Visitor information facilities may be used to interpret cultural and natural resource features, but are not elaborate and harmonize with the setting.  | Obvious & numerous controls & regimentation<br>Sophisticated information facilities |
| On-site Development                         | Facilities and structures generally do not exceed Level II standards and are maintained to accommodate the types and levels of use anticipated for the site. Recreation cabins are fully compatible.   | Development Level IV or V sites and facilities                                      |

ROS CLASS  
SEMI-PRIMITIVE NON-MOTORIZED  
(continued)

Setting Conditions 1/

| Setting Indicators | NORM/FULLY COMPATIBLE   | UNACCEPTABLE   |
|--------------------|---|--|
| Social Encounters  | User meets less than 6-10 parties per day on trails and streams. No other parties are within sight or sound of dispersed campsites. 1-3 other parties within sight or sound of campsites is acceptable only during peak season use. | Meet >10 parties/day during trip. >3 other parties at campsites. |
| Visitor Impacts    | User caused impacts to resources are moderate and usually not long-lasting. Site hardening is limited to boardwalk trails, boat tramways, moorings and docks and bearproof food cache facilities.                                   | Long-lasting User impacts Dominate site hardening                |

1/ Setting Conditions represent R-10 and ANILCA provisions.

ROS CLASS  
PRIMITIVE

Setting Conditions 1/

| Setting Indicators                          | NORM/FULLY COMPATIBLE  | UNACCEPTABLE  |
|---|--|---|
| Visual Quality of Non-recreation Activities | Not to exceed a visual quality objective Retention. An existing visual condition of Preservation is fully compatible and encouraged to be maintained.  | Any visual condition that exceeds Retention of the characteristic landscape.  |
| Access                                      | Cross-country travel and travel on non-motorized trails within the Management Area or designated ROS zone. Use of airplanes, helicopters, motorboats and snow-machines for traditional activities, subsistence, emergency search and rescue, and authorized administrative activities may occur unless specifically restricted for safety and/or resource protection purposes. | All <u>other</u> motorized travel <u>with in</u> the area or zone.  |
| Remoteness                                  | No or infrequent sights and sounds of human activity is present. Setting is located more than 1.5 hours walking or paddling distances from any human developments other than marine travelways.  | Frequent near or distant sight/sound of human activity. >1.5 hr. walk/paddle from developments. No perception of remoteness |
| Visitor Management                          | On-site regimentation and controls are very rare. Signing is limited to directional information and safety needs. No on-site interpretive facilities are used and there is great opportunity for discovery on the part of the user.  | Noticeable on-site regimentation and controls. Excessive on-site information and interpretation.                            |
| On-site Development <u>2/</u>               | Structures do not exceed Level I standards except for recreation cabins, and are maintained for appropriate levels of use.   | Any site or facility > Level I  |



ROS CLASS  
PRIMITIVE

Setting Conditions 1/

| Setting Indicators | NORM/FULLY COMPATIBLE  | UNACCEPTABLE  |
|--------------------|--|---|
| Social Encounters  | User meets less than 1-3 parties per day during trip. No other parties are within sight or sound of dispersed campsites or cabins. | Meet 4 or more parties per day. Other parties visible at campsites. |
| Visitor Impacts    | User caused impacts to resources are slight and usually not noticeable the following year.   | User impacts are noticeable or site harding is inappropriate.       |

1/ Setting Conditions represent R-10 Standards and ANILCA provisions.

2/ Authorized recreation cabins are considered compatible.

ROS CLASS  
PRISTINE

Setting Conditions

| Setting Indicators                          | NORM/FULLY COMPATIBLE  | UNACCEPTABLE   |
|---|--|--|
| Visual Quality of Non-recreation Activities | Preservation   | Any other visual condition   |
| Access                                      | Cross-country travel on non-motorized trails. Infrequent nonmechanized subsistence use                                       | All motorized access, including airplanes, helicopters and boats.  |
| Remoteness                                  | User is out of sight and sound of human activity. More than 1.5 hours travel by walking or paddling from human developments. | Near or distant sight or sound of human activity. <1.5 hour walk/paddle from road. No perception of remoteness |
| Visitor Management                          | Low regimentation. No on-site controls or information facilities.  | Noticeable on-site regimentation and controls. On-site information or interpretation facilities.               |
| On-Site Development                         | No development sites   | Any site or facility > Level I   |

ROS CLASS  
PRISTINE

Setting Conditions

| Setting Indicators | NORM/FULLY COMPATIBLE  | UNACCEPTABLE  |
|--------------------|--|---|
| Social Encounters  | Meet < one party/day during trip. No other parties visible at campsites.               | Meet 4 or more other parties per day. Other parties visible at campsites. |
| Visitor Impacts    | Unnoticeable impacts caused by user. No site hardening (i.e., boardwalk trails, etc.). | User impacts are noticeable   |



RESOURCE: VISUAL

Activity: Visual Resource Operations

NAS Code: AV1

I. General Direction

- A. Adopted Visual Quality Objectives (VQO's) provide direction in managing all land areas and coincide with the goals, direction and objectives of the management area.
- B. Adopted Visual Quality Objectives would be met to the greatest extent practicable.
- C. Detailed landscape analysis is recommended for all development activities and is required for all activities within viewsheds seen from sensitivity level 1 and 2 travel routes and areas. Consult the National Forest Landscape Management Handbook series and R10 Forest Service Handbook 2309 for guidance. Chapter 1, The Visual Management System; Chapter 4, Roads; and Chapter 5, Timber, have the greatest application to the management activities proposed herein.
- D. Complete viewshed analyses in conjunction with project level planning. Priority for viewshed analysis is as follows: 1) Scenic Viewshed Prescription Areas, 2) other sensitivity level 1 areas or portions thereof, 3) other visually sensitive viewsheds identified in the planning period.

Standards and Guidelines

- 1. Consult National Forest Landscape Management Handbooks for guidance.
- 2. Involve needed resource disciplines in the analysis process.

Activity: Visual Resource Preparation

NAS Code: AV11

I. General Direction

Provides for the inventorying, planning, coordinating and preparing for management activities within each Visual Quality Objective setting.

A. VQO Preservation

Allow ecological changes only, with the objective to achieve or maintain a pristine environment.

## Standards and Guidelines

Facilities: Very low impact recreation facilities and management activities are allowed (includes: trails and small, minor signs, minimal impact fish & wildlife projects, etc.).

### B. VQO Retention

To the extent feasible, design and locate management activities so that they are not visually evident to the casual observer. This objective should be accomplished immediately following the completion of management activities.

## Standards and Guidelines

### 1. Facilities

- a. Coloring of structures should closely correlate to natural conditions.
- b. Clearing of vegetation adjacent to the site should be kept to a minimum.
- c. Select materials that blend with the natural surroundings.
- d. Locate facilities in such a way as to minimize their visibility from sensitive viewpoints.
- e. Re-establish vegetation cover immediately after project work is completed.

### 2. Transportation

#### a. Rock or Borrow Sources

- i. As much as possible, select locations that are not visible from sensitive viewpoints.
- ii. Borrow sources should not be located within harvest units visible from sensitive viewpoints.

#### b. Corridor Treatment

Provide for roadside cleanup of ground disturbing activities.

#### c. Log Transfer Facilities (LTF's)

Generally are not appropriate in this VQO setting.

#### d. Road Design and Construction

- i. Where feasible, locate collector and local roads in locations screened from sensitive viewpoints. Attempt to locate roads along natural benches to minimize cuts and fills.
- ii. Where feasible, try to revegetate temporary roads within one full growing season following road closure.
- iii. In areas visible from sensitivity level 1 & 2 viewpoints, slash treatment will be such that there will be noticeable slash and a treated area conforms to natural terrain vegetative patterns.
- iv. Road design and location should consider current and future multiple use opportunities such as scenic vistas, trail and stream access, etc.
- v. Long straight sections of road should be avoided. Road alignment should be adjusted to conform to natural terrain and vegetation patterns.
- vi. Roads should be located along natural edges rather than through the center of landscape features such as natural openings.
- vii. Roadside clearing should be kept to a minimum. Undulate or feather clearing boundaries where appropriate to better blend the clearing limits with natural vegetative patterns.
- viii All cut and fill slopes should be rehabilitated as a part of the road construction.
- ix. Standard Forest Service signs should be provided at significant natural features such as stream crossing to help visitors orient themselves.

#### 3. Vegetative Management

Manage existing vegetation within immediate foreground areas of the arterial road, recreation sites, and other public use sites so that management activities are not visually evident.

- a. Layout timber harvest units so as to blend with the surrounding landscape by following natural vegetative patterns, topographic contours, and by using feathering techniques along unit boundaries.



- b. Sale layout personnel should consult the Forest landscape architect prior to field layout of harvest units within foreground areas of the arterial Montague Island road and other sensitivity level 1 and 2 viewpoints. As deemed necessary, the Forest landscape architect should review final layout in the above locations.
  - c. Where regeneration harvest units are adjacent to the unit size should be restricted to not exceed 500 feet in frontage length along the travel route.
  - d. During sale unit layout try to use vegetative buffers or islands, undulated edges or topographic screening to limit the size of openings that are visible from any given sensitive viewpoint to 2 acres or less vegetative buffers or islands may be treated by individual or group tree selection.
  - e. Stump heights should be 12" or less within 150' of road and stump cuts should be angled away from the viewpoints. Sensitive travel routes or viewpoints.
  - f. Slash should be removed within 150' of the edge of the traveled way. Within the next 50' slash shall lie within 2' of the ground.
  - g. Units should be located so edges are not skylined and/or bole lines are not continuous.
  - h. Nonsystem roads should be closed and revegetated after harvest.
  - i. To the extent feasible, locate log decks and landings out of sight of views from sensitive viewpoints and travel routes.
  - k. Where feasible, utilize appropriate silvicultural techniques to maintain or enhance species diversity in understory and overstory vegetation.
  - l. To the extent feasible, minimize ground disturbance by requiring low impact harvest systems such as skidding arches, skidding pans, wide pads on tractors, rubber-tired skidders, articulated skidders, small tractors, cable systems.
4. If project monitoring indicates a need for visual rehabilitation measures, a rehabilitation plan would be developed in an interdisciplinary setting.

## C. VQO Partial Retention

Design activities to be subordinate to the landscape character of the area. This VQO should be accomplished within one year of project completion.

### Standards and Guidelines

#### 1. Facilities

- a. Emphasize enhancement of views both to and from the facility.
- b. Use colors and materials found in the natural environment or that blend with the natural surroundings.

#### 2. Transportation

- a. Design rock sources to not be seen from sensitive travel routes. Rehabilitation plans would be necessary following closure of the pit.
- b. LTF

Develop rehabilitation plan at the close of contract on LTF life. LTF should be designed so as to minimize visibility from sensitive view points.

#### c. Road Design and Construction

- i. Locate roads in locations screened from sensitive viewpoints. Locate roads along natural benches to minimize cuts and fills.
- ii. Revegetate nonsystem roads within one season of closure.
- iii. In areas visible from sensitivity level 1 and 2 viewpoints, slash treatment should be such that there should be no noticeable slash and a treated area that conforms to natural terraine vegetative patterns.
- iv. Road design and location should consider current and future multiple use opportunities such as scenic vistas, trail and stream access, etc.
- v. Long straight sections of road should be avoided. Road alignment should be adjusted to conform to natural terrain and vegetation patterns.

- vi. Roads should be located along natural edges rather than through the center of landscape features such as natural openings.
- vii. Roadside clearing should be kept to a minimum. Undulate or feather clearing boundaries where appropriate to better blend the clearing limits with natural vegetative patterns.
- viii All cut and fill slopes should be rehabilitated as a part of the road construction.
- ix. Standard Forest Service signs should be provided at significant natural features such as stream crossing to help visitors orient themselves.

### 3. Vegetative Management

Manage existing vegetation within immediate foreground areas of the arterial road, recreation sites, and other public use sites so that management activities are not visually evident.

- a. Layout timber harvest units so as to blend with the surrounding landscape by following natural vegetative patterns, topographic contours, and by using feathering techniques along unit boundaries.
- b. Sale layout personnel should consult the Forest landscape architect prior to field layout of harvest units within foreground areas of sensitivity level 1 and 2 viewpoints.
- c. Where regeneration harvest units are adjacent to the designated sensitive travel routes, unit size should be restricted to not exceed 600 feet in frontage length along the travel route.
- d. During sale unit layout try to use vegetative buffers or islands, undulated edges or topographic screening to limit the size of openings that are visible from any given sensitive viewpoint to 5 acres or less.
- e. Stump heights should be 12" or less within 100' of sensitive travel corridors and stump cuts should be angled away from view.
- f. Slash shall be removed from within 50' of sensitive travel routes or viewpoints. Within the next 50', slash shall lie within 2' of the ground after treatment.



- g. Units should be located so edges are not skylined and/or bole lines are not continuous.
  - h. To the extent feasible, locate log decks and landings out of sight of views from sensitive viewpoints and travel routes.
  - i. Where feasible, utilize appropriate silvicultural techniques to maintain or enhance species diversity in understory and overstory vegetation.
  - j. To the extent feasible, minimize ground disturbance by using low impact harvest systems.
4. If project monitoring indicates a need for visual rehabilitation measures, a rehabilitation plan would be developed in an interdisciplinary setting.

D. VQO Modification

Activities that visually dominate the original characteristic landscape. Activities and facilities should borrow from natural forms, lines, colors and textures so that their visual characteristics are compatible with the natural surroundings. This VQO should be met within one year in the foreground distance zone and within five years in the middle and background distance zones.

E. VQO Maximum Modification

Area may be dominated by management activities.

Standards and Guidelines

Design activities to resemble natural occurrences as viewed in the background distance zone.

- F. Update visual resource inventories as project implementation changes sensitivity levels, seen areas (due to new roads, trails, cabins or other recreation use areas) and use patterns. Revise inventoried VQO's as appropriate to reflect these changes. Use the revised inventoried VQO's to guide consideration of revision of adopted VQO's through Forest Plan amendment or revision.

Activity: Visual Resource Administration

NAS Code: AV12

I. General Direction

Provides for rehabilitation, mitigation, enhancement and monitoring of the visual resource.

- A. Minimize potential visual impacts through scheduling design and/or timing management activities. This is covered under AV11.

- B. Rehabilitate, where practicable, existing projects and areas which do not meet the Adopted Visual Quality Objectives. Consider the following in setting priorities:
1. Relative importance of the area (public sensitivity).
  2. Projected length of time to naturally attain the Adopted VQO in comparison to the cost and effectiveness of rehabilitation techniques. Examples of possible rehabilitation projects include: revegetating road cuts and borrow areas, removing road side slash and debris, re-shaping harvest unit boundaries, cutting road side stumps as low as possible, shaping/spreading excess overburden, etc.
  3. Benefits to other resources by accomplishing rehabilitation.
- C. Use enhancement measures, where practicable, to achieve the desired visual character for an area when that desired visual character has been defined as something different than the existing situation. Prioritize enhancement activities based on the visual sensitivity of the areas and the degree to which their existing character differs from a defined desired landscape character. Definitions of desired landscape character must be developed through viewshed planning direction prior to engaging in enhancement activities. An emphasis of enhancement measures will often be to create variety where little variety now exists through addition, subtraction, or alteration of vegetation, earthforms, waterforms, etc. Examples include: opening up vistas, screening out undesirable views, and planting of species to give unique form, color or texture to an area.
- D. Monitor changes in the visual resources: Consult the Landscape Management Handbook, Region 10, chapter concerning monitoring.

#### Standards and Guidelines

1. Determine the visual resource consequences of implementing the standards, guidelines and projects approved in the management area analysis.
2. Assess the implementation of activities that alter visual quality.
3. Monitor the effect of natural and managed visual resource rehabilitation upon existing landscape alterations.
4. Based upon the above monitoring activities, update maps and tables tracking the number of acres in each visual condition class.

- E. Monitor compliance with VQO's. Monitoring should be conducted to assure a high level of overall compliance with VQO's in accordance with Landscape Management Handbook, Region 10.

Standards and Guidelines

1. Management area-wide visual conditions should meet VQO's for at least 95% of the land base affected by management activities.
2. Areas not in compliance with VQO's would be identified through a comparison of updated visual condition data to the adopted VQO's. Evaluate and prioritize those areas relative to their potential as visual rehabilitation projects.



RESOURCE: Fish

Activity: Fish Habitat Inventory

NAS Code: CF111

I. General Direction

- A. Develop and maintain a channel type and stream class (see glossary) based inventory of all streams within the management area.

Standards and Guidelines

1. Identify the channel type and stream class of all streams which are adjacent to proposed land disturbing activities prior to final project design and layout. Concentrate on those portions of the streams which have the potential to be impacted by the proposed activity.
  2. Initiate a channel type and stream class inventory for all streams within the management area, prior to the next Forest Plan revision. Consult publication R10-MB-6, the "Channel Types Field Guide," (as revised) for descriptions of the channel types.
  3. Maintain and update the channel type and stream class inventory during site specific project planning.
- B. Gather adequate information to develop and verify the Potential Management Indicator Species (PMIS) habitat capability models prior to revision of the Forest Plan.

Standards and Guidelines

1. Initiate surveys and inventories to identify population levels, habitat use patterns, and potential limiting factors for PMIS within the management area.
2. Inventories should be correlated with channel type classifications.

Activity: Fish Habitat Planning

NAS Code: CF112

I. General Direction

- A. During the design and implementation of management activities which are likely to affect fish habitat, favor the protection or enhancement of natural fish habitat over mitigation or rehabilitation.
- B. Use Potential Management Indicator Species (PMIS) to evaluate the effects of management activities on fish.

## II. General Direction - Management of Aquatic Habitat Management Units

Stream and lakeside Aquatic Habitat Management Units (AHMU) will be managed to maintain or improve habitat for fish and other riparian dependent species.

### Standards and Guidelines

1. Stream and lakeside AHMU would be identified and documented prior to project design or layout for any activity effecting fish habitat.
2. At a minimum, AHMU would include the area up to 100 horizontal feet from the edges of all perennial streams, lakes, and other bodies of water. The AHMU would also include adjacent areas dominated by riparian vegetation and other areas which substantially influence the riparian zone through inputs of nutrients, energy, or large woody debris. The AHMU would also include high landslide, erosion, and windthrow hazard areas associated with streams or riparian areas.
3. Timber harvest levels, harvest methods, and road construction techniques would be designed to meet AHMU management objectives.

## III General Direction - Management Objectives for Fisheries Habitat

Streams within the Management Area have been placed into three different categories based on their ability to support fish populations. These categories are defined as follows:

- Class I - Streams with anadromous fish habitat or with high value resident sport fisheries. This also includes the habitat upstream from migration barriers if there is a reasonable opportunity to provide fish passage in the future.
- Class II - Streams with resident fish populations which have limited sport fisheries values. These generally occur upstream of anadromous migration barriers or are steep gradient streams which preclude anadromous fish use.
- Class III - Streams which do not contain significant populations of resident fish, but which have potential water quality influences on downstream fish habitat.

The management objectives for each stream class are shown below:

- A. Class I: Maintain or enhance the habitat capability of all anadromous and high value resident fish habitat.

- B. Class II: Maintain habitat capability for resident fish populations, to the extent practicable.
- C. Class III: Maintain water quality to avoid impacts to downstream Class I and II streams.

#### IV. General Direction - Management Activities

Location and design of timber harvest activities, road construction, and trail construction within Aquatic Habitat Management Units require special consideration to insure that riparian area characteristics for fish habitat, water quality and other riparian dependent resources are protected.

As most fish habitat is included within the Class I streams, specific standards and guidelines for this class follow. Standards and guidelines for Class II and Class III streams are generally less restrictive than for Class I streams. Consult the Aquatic Habitat Management Handbook, FSH 2609.24.

- A. Maintain existing stream bank and stream channel conditions with specific reference to: width-to-depth ratio, pools and riffles, undercut banks, stable debris, and other instream cover characteristics.

##### Standards and Guidelines

1. Directionally fall timber away from streamcourses (to include lining and jacking as necessary).
  2. Use streams as split lines whenever possible (i.e. logs should be yarded away from the stream in both directions rather than across the channel.)
  3. Fully suspend any trees or products yarded across streamcourses.
  4. Felled or windfallen trees designated for removal from streamcourses will not be limbed until clear of the streamcourse.
  5. Remove all small, unattached debris introduced into the streamcourse by human activity within 48 hours of its introduction.
  6. Leave standing all trees which affect streambank stability, including all deciduous and unmerchantable vegetation.
- B. Maintain natural and beneficial quantities of large woody debris (LWD) over the short and long term.



### Standards and Guidelines

1. Leave all existing (natural) instream debris.
  2. Leave any trees that cannot be directionally felled away from the streamcourse.
  3. Leave all windthrow in or suspended over the stream channel unless doing so would adversely effect stream channel stability. Allow salvage only if AHMU objectives are met.
  4. Leave all trees inadvertently felled into or across streams in place unless doing so would adversely effect stream channel stability.
  5. Leave as many of the following trees as possible within 75 ft. of the stream:
    - a. deciduous trees
    - b. coniferous trees less than 12 in. DBH
    - c. snags
    - d. trees with a 10% or greater lean toward the stream
  6. Designate additional leave trees as necessary to provide for future sources of large woody debris (LWD).
  7. Retain trees for LWD on both sides of the stream.
  8. Design second growth management programs in riparian areas to provide future sources of LWD.
- C. Maintain water quality to provide for fish production.

### Standards and Guidelines

1. No ground lead yarding downhill within V-notches.
2. Revegetate areas of exposed mineral soil during the first growing season following exposure.
3. Locate stream crossings only in stable reaches. Design crossings of V-notched drainages to prevent debris jamming. Culvert gradient should follow natural gradient for non-fish streams where needed to prevent downstream erosion. Require bridge brow logs for log stringer bridges to contain bridge surfacing materials and prevent entry of sediment into the stream. For further location and design guidance consult the Road Preconstruction and Drainage Structures Handbooks.

4. Permit the location of roads and trails parallel to fish bearing streams and crossing of fish streams only where other locations are not feasible and the management direction for fish habitat can be met. Leave as much undisturbed ground cover as possible between the road and the stream. Complete endhaul of waste material will be required where roads are located near fish streams when there is the probability of downhill movement of the material into the stream below.
5. Minimize the use of heavy equipment in streams. Where necessary, the timing of these activities will be restricted to avoid adverse impacts to salmonid eggs and pre-emergent fry.

D. Maintain or improve primary productivity in streams.

Standards and Guidelines

1. Normally, precommercially thin mixed stands to the streambank's edge along streams with gradients between 0 and 6 percent.
2. Manage alder immediately adjacent to the stream to provide 75 percent shade on the stream.
3. Emphasize precommercial and commercial thinning of stands along streams rather than stands that are not within the riparian zone.
4. Remove the complete canopy only along stream sections with abundant instream cover or along streams which are not temperature sensitive.

E. Maintain fish passage through stream crossing structures for adult and juvenile anadromous fish and for high quality resident sportfish.

Standards and Guidelines

1. Provide fish passage for all species on all streams with natural stream gradients of less than 4 percent.
2. For streams with gradients greater than 4 percent, evaluate the potential tradeoff between the loss of rearing fish production and the cost of providing passage for juvenile fish. Consult the Aquatic Habitat Management Handbook, FSH 2609.24 for the method of making trade-off comparisons.

- F. The following table provides additional Standards and Guidelines for timber harvest activities within riparian zones. Distances are in horizontal feet. Distances shown are to be windfirm; greater distance may be required to achieve reasonable assurance that windthrow will not occur within the windfirm distance as a result of adjacent harvest activity.

Activity: Monitoring

NAS Code: CF121

General Direction - Management Areawide Monitoring

Conduct monitoring programs of all PMIS or their habitats to determine the effects of implementing the projects approved in the Management Area Analysis.

Activity: Fish Habitat Improvement

NAS Code: CF22

General Direction

Enhance fish habitat to meet the objectives identified in the Management Area Analysis.

Standards and Guidelines

1. Evaluate potential fish habitat improvement projects identified in the plan with on-the-ground surveys to determine project feasibility.
2. Refer feasible projects to the Regional Salmon Planning Team for their review and for inclusion into the Prince William Sound Comprehensive Salmon Plan.
3. Schedule and implement feasible fish habitat improvement projects to meet the objectives of the plan.
4. If additional fish habitat improvement opportunities are identified during resource development activities or through contacts with the public or other agencies, they will be evaluated for feasibility and added to the 5 year fish enhancement plan. High priority projects may replace habitat improvement projects identified in the plan so long as the objectives of the plan are met.
5. Coordinate fish habitat improvement projects with other resource development activities whenever possible.

Activity: Fish Habitat Project Maintenance

NAS Code: CF23

General Direction

Provide for the maintenance of fish habitat improvements.



### Standards and Guidelines

1. Fund maintenance of existing projects prior to the construction of new projects.
2. Develop a written agreement with project cooperators on maintenance responsibilities prior to project construction.

**Low Gradient Floodplains**  
(Channel types B1, B8, C1, C3, C4, C6, D4, D5)

| Stream Class           |   |
|------------------------|---|
| I                      |   |
| <b>Objective</b>       | <ul style="list-style-type: none"> <li>-Maintain or enhance aquatic biological productivity.</li> <li>-Allow no measurable reduction in smolt habitat capability except when natural processes result in greater change.</li> <li>-Restore stream and/or watershed condition.</li> <li>-Maintain/manage mature forest characteristic habitat for riparian dependant wildlife species.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Maintain long term supply of woody debris sources within the process group.</li> <li>-Allow no activities causing floodplain destabilization.</li> </ul> |
| <b>Harvest Control</b> | <ul style="list-style-type: none"> <li>-Allow no programmed harvest within 0 to 60 windfirm feet of B1 or B8 channel types not associated with other channel types.</li> <li>-Allow single tree selection harvest method within 60 to 200 windfirm feet of B1 or B8 channel types not associated with other channel types.</li> <li>-Allow no programmed harvest within 0 to 200 windfirm feet for the remainder of channel types.</li> <li>-Consider all harvest methods, on a case-by-case basis, if riparian is greater than 200 feet.</li> <li>-Maintain 90% of the optimum basal area with tree 16"+ dbh within the no programmed harvest area.</li> </ul>               |
| <b>Salvage</b>         | <ul style="list-style-type: none"> <li>-Generally, do not salvage windthrown trees suspended over or in streams.</li> <li>-Allow salvage in the no programmed harvest area while meeting objectives.</li> </ul>   |
| <b>Roading</b>         | <ul style="list-style-type: none"> <li>-Locate roads in this area only when other reasonably feasible routes do not exist.</li> </ul>   |

NOTES: -Timber harvest guidelines may vary, based on site specific analysis, in order to meet Aquatic Habitat Management Unit objectives.  
 -Incidental cutting of trees may be allowed in areas not programmed for harvest on a case-by-case basis. (ex. bridge stringers)

High Gradient Incised Channels  
(Channel types A1,A2,A4,A5,A6,A7,B7,D2,D7)

| Stream Class    |  |
|-----------------|--|
|                 | III  |
| Objective       | -Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.<br>-Maintain streambank and channel integrity. |
| Harvest Control | -Allow harvest to streambank while meeting objectives.<br>-Full suspension required to cross stream channel.   |
| Salvage         | -Allow salvage while meeting objectives.   |
| Roading         | -Special road construction techniques may be required to maintain water quality  |

NOTE: -Timber harvest guidelines may vary, based on site specific analysis, in order to meet Aquatic Habitat Management Unit objectives.  
-Stream Classes I and II do not normally occur in this channel type group.



## Estuary Channels

## **Stream Class**

**NOTE:** -Timber harvest guidelines may vary, based on site specific analysis, in order to meet

**Aquatic Habitat Management Unit objectives.**

-Incidental cutting of trees may be allowed in areas not programmed for harvest on a case-

by-case basis. (ex. bridge stringers).

-Stream Classes II and III do not normally occur in this channel type group.

# Alluvial Fans

(Channel types A3, B5, D1, D6)

## Stream Class

|                 | I   | II   | III   |
|-----------------|---|--|---|
| Objectives      | <ul style="list-style-type: none"> <li>-Maintain or enhance aquatic biological productivity.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Allow no activities causing floodplain destabilization.</li> <li>-Restore stream and/or watershed condition.</li> <li>-Allow no measurable reduction in smolt habitat capability except when natural processes result in greater change.</li> <li>-Maintain/manage mature forest characteristic riparian dependent wildlife species.</li> </ul> | <ul style="list-style-type: none"> <li>-Maintain habitat capability for resident fish to the extent practicable.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Allow no activities causing floodplain destabilization.</li> </ul> | <ul style="list-style-type: none"> <li>-Allow no activities causing floodplain destabilization.</li> <li>-Allow no soil disturbing activities that will still produce sediment one year after disturbance.</li> </ul>   |
| Harvest Control | <ul style="list-style-type: none"> <li>-Allow no programmed harvest within active portion of fan or 60 windfirm feet of streambank, whichever is greater.</li> <li>-All harvest methods are available on remaining inactive portion of fan while meeting objectives.</li> </ul>   | <ul style="list-style-type: none"> <li>-Allow no programmed harvest within active portion of fan or 25 windfirm feet of streambank, whichever is greater.</li> <li>-Single tree selection 25 to 60 windfirm feet from streambank if not within active portion of fan.</li> </ul>                                   | <ul style="list-style-type: none"> <li>-Allow no programmed harvest within active portion of fan or 25 windfirm feet of streambank, whichever is greater.</li> <li>-All harvest methods are available on remaining inactive portion of fan while meeting objectives.</li> </ul> |

Alluvial Fans (Cont.)  
(Channel types A3, B5, D1, D6)

| Stream Class               |  |  |   |
|----------------------------|--|--|---|
|                            | I  | II   | III   |
| Harvest Control<br>(Cont.) | -Maintain 90% of the optimum basal area with trees 16"+ dbh within the no programmed harvest area.   | -All harvest methods are available on remaining inactive portion of fan while meeting objectives.<br>-Harvest not to exceed 50% of the forest land of individual fan. Remaining forest land not to be harvested until created openings contain 50 foot conifer trees (approx. 30 years). | -Harvest not to exceed 50% of the forest land of individual fan. Remaining forest land not to be harvested until created openings contain 50 foot conifer trees (approx. 30 years). |
| Salvage                    | -Generally, do not salvage windthrown trees suspended over or in streams.<br>-Allow salvage in the no programmed harvest areas while meeting objectives. | -Allow salvage in all areas while meeting objectives.  |   |
| Roading                    | -Special road construction techniques may be required to ensure fish passage.  |  |   |

NOTES: -Timber harvest guidelines may vary, based on site specific analysis, in order to meet Aquatic Habitat Management Unit objectives.  
-Incidental cutting of trees may be allowed in areas not programmed for harvest on a case-by-case basis. (ex. bridge stringers).



Low Gradient Nonforested Channels and Moderate Gradient Footslope Channels  
(Channel types B2,B3)

| Stream Class           |   |   |  |
|------------------------|---|---|--|
|                        | I   | II  | III  |
| <b>Objectives</b>      | -Maintain or enhance aquatic biological productivity.<br>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.<br>-Allow no measurable reduction in smolt habitat capability except when natural processes result in greater change.<br>-Maintain/manage mature forest characteristic habitat for riparian/life dependent wildlife species. | -Maintain habitat capability for resident fish to the extent practicable.<br>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.<br>-Maintain streambank and channel integrity. | -Maintain streambank and channel integrity.<br>-Allow no soil disturbing activities that will still produce sediment one year after disturbance.       |
| <b>Harvest Control</b> | -Allow single tree selection only.  | -Allow single tree selection within 25 windfirm feet of B2 channels.<br>-Allow single tree selection within 60 windfirm feet of B3 channels.<br>-All harvest methods are available on remaining area.                                   | -Allow single tree selection within 25 windfirm feet of B2 channels.<br>-All harvest methods are available on remaining area while meeting objectives. |
| <b>Salvage</b>         | -Generally, do not salvage windthrown trees suspended over or in streams.<br>-Allow salvage in the no programmed harvest areas while meeting objectives.  | -Allow salvage windthrown trees suspended over programmed harvest areas while meeting objectives.   | -Allow salvage in all areas while meeting objectives.  |
| <b>Roading</b>         | -Special road construction techniques may be required to ensure fish passage.   |   |  |

**NOTES:** -Timber harvest guidelines may vary, bases on site specific analysis, in order to meet Aquatic Habitat Management Unit objectives.  
 -Incidental cutting of trees may be allowed in areas not programmed for harvest on a case-by-case basis. (ex. bridge stringers).

**Lakes and Ponds**  
(Channel types L, L3, L4, L5)

**Stream Class**

|                        | I  | II   | III   |
|------------------------|--|--|---|
| <b>Objectives</b>      | <ul style="list-style-type: none"> <li>-Maintain or enhance aquatic biological productivity.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Allow no measurable reduction in smolt habitat capability except when natural processes result in greater change.</li> <li>-Maintain/manage mature forest characteristic habitat for riparian dependent wildlife species.</li> </ul> | <ul style="list-style-type: none"> <li>-Maintain habitat capability for resident fish to the extent practicable.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> </ul>   | <ul style="list-style-type: none"> <li>-Allow no soil disturbing activities that will still produce sediment one year after disturbance.</li> </ul>   |
| <b>Harvest Control</b> | <ul style="list-style-type: none"> <li>-Allow unevenage management within 200 feet of lake.</li> <li>-Any harvest method applies for remainder of area while meeting objectives.</li> </ul>  | <ul style="list-style-type: none"> <li>-Allow unevenage management within 100 feet of lake less than 500 acres in size.</li> <li>-Allow unevenage management within 200 feet of lakes greater than 50 acres in size</li> <li>-Any harvest methods apply for the remainder of the area while meeting objectives.</li> </ul> | <ul style="list-style-type: none"> <li>-Maintain a minimum of 50% shading vegetation if temperature sensitive lakes occur.</li> <li>-Any harvest methods apply while meeting objectives.</li> </ul> |
| <b>Salvage</b>         | <ul style="list-style-type: none"> <li>-Generally, do not salvage windthrown trees suspended over or in lakes, ponds, or sloughs.</li> </ul>   | <ul style="list-style-type: none"> <li>-Allow salvage in all other areas while meeting objectives.</li> </ul>  | <ul style="list-style-type: none"> <li>-Allow salvage in all areas while meeting objectives.</li> </ul>   |
| <b>Roading</b>         | <ul style="list-style-type: none"> <li>-Roads may be allowed if other practical alternatives are not available or if needed to access the water body for recreation or other needs.</li> </ul>   |  |   |

**NOTES:** -Timber harvest guidelines may vary, bases on site specific analysis, in order to meet Aquatic Habitat Management Unit objectives.

Moderate Gradient Incised Channels  
(Channel types B4, B6)

Stream Class

|                        | I  | II  | III  |
|------------------------|--|---|--|
| <b>Objectives</b>      | <ul style="list-style-type: none"> <li>-Maintain or enhance aquatic biological productivity.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Allow no measurable reduction in smolt habitat capability except when natural processes result in greater change.</li> <li>-Maintain/manage mature forest characteristic habitat for riparian dependent wildlife species.</li> </ul> | <ul style="list-style-type: none"> <li>-Maintain habitat capability for resident fish to the extent practicable.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Maintain streambank and channel integrity.</li> </ul> | <ul style="list-style-type: none"> <li>-Maintain streambank and channel integrity.</li> <li>-Allow no soil disturbing activities that will still produce sediment one year after disturbance.</li> </ul> |
| <b>Harvest Control</b> | <ul style="list-style-type: none"> <li>-Selectively leave trees with crowns that do not extend above slope break.</li> <li>-Minimize soil disturbance associated with yarding within inner gorge.</li> <li>-Maintain near natural snag component of stand.</li> <li>-No harvest within 25 feet bank.</li> </ul>  | <ul style="list-style-type: none"> <li>-Selectively leave trees with crowns that do not extend above slope break.</li> <li>-Minimize soil disturbance associated with yarding within inner gorge.</li> </ul>  | <ul style="list-style-type: none"> <li>-All harvest methods apply while meeting objectives.</li> </ul>   |
| <b>Salvage</b>         | -Generally, do not salvage windthrown trees suspended over or in stream.   |   |  |
| <b>Roading</b>         | <ul style="list-style-type: none"> <li>-Road construction is generally not appropriate in this process group. Where road crossings are required, minimize erosion and sediment associated with road crossing approaches within inner gorge.</li> </ul>   |   |  |

**NOTES:** -Timber harvest guidelines may vary, bases on site specific analysis, in order to meet Aquatic Habitat Management Unit objectives.



Large Low Gradient Incised Channels  
(Channel types C2, C5)

Stream Class

|                        | I  | II  |
|------------------------|--|---|
| <b>Objectives</b>      | <ul style="list-style-type: none"> <li>-Maintain or enhance aquatic biological productivity.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Maintain streambank and channel integrity</li> <li>-Allow no measurable reduction in smolt habitat capability except when natural processes result in greater change.</li> <li>-Maintain/manage mature forest characteristic habitat for riparian dependant wildlife species.</li> </ul> | <ul style="list-style-type: none"> <li>-Maintain habitat capability for resident fish to the extent practicable.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Maintain streambank and channel integrity.</li> </ul> |
| <b>Harvest Control</b> | <ul style="list-style-type: none"> <li>-Allow no programmed harvest.</li> </ul>  | <ul style="list-style-type: none"> <li>-Allow no programmed harvest within 25 windfirm feet of streams.</li> <li>-Minimize soil disturbance associated with yarding within inner gorge.</li> <li>-Full suspension yarding required to cross stream channel.</li> </ul>                                |
| <b>Salvage</b>         | -Generally, do not salvage windthrown trees suspended over or in streams.  |   |
| <b>Roading</b>         | <ul style="list-style-type: none"> <li>-Road construction is generally not appropriate in this process group. Where road crossings are required, minimize erosion and sedimentation associated with road crossing approaches within inner gorge.</li> </ul>  |   |

**NOTES:** -Timber harvest guidelines may vary, bases on site specific analysis, in order to meet Aquatic Habitat Management Unit objectives.  
 -Incidental cutting of trees may be allowed in areas not programmed for harvest on a case-by-case basis. (ex. bridge stringers).  
 -Stream Class III does not normally occur in this channel type group.

Placid or Glide Channels  
(Channel types L1, L2)

Stream Class

|                        | I   | II  |
|------------------------|---|---|
| <b>Objectives</b>      | <ul style="list-style-type: none"> <li>-Maintain or enhance aquatic biological productivity.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Maintain streambank and channel integrity</li> <li>-Allow no measurable reduction in smolt habitat capability except when natural processes result in greater change.</li> <li>-Maintain/manage mature forest</li> <li>characteristic habitat for riparian dependant wildlife species.</li> </ul> | <ul style="list-style-type: none"> <li>-Maintain habitat capability for resident fish to the extent practicable.</li> <li>-Allow no soil disturbing activities that will still produce excessive sediment one year after disturbance.</li> <li>-Maintain streambank and channel integrity.</li> </ul> |
| <b>Harvest Control</b> | <ul style="list-style-type: none"> <li>-Allow no programmed harvest.</li> <li>-Allow incidental tree selection (e.g. bridge stringers)</li> </ul>   |   |
| <b>Salvage</b>         | <ul style="list-style-type: none"> <li>-Generally, do not salvage windthrown trees suspended over or in streams.</li> <li>-Non-ground disturbing salvage permitted while meeting objectives (e.g. helicopter)</li> </ul>  |   |
| <b>Roading</b>         | <ul style="list-style-type: none"> <li>-Roading is generally not appropriate in this process group.</li> </ul>  |   |

**NOTES:** -Timber harvest guidelines may vary, bases on site specific analysis, in order to meet Aquatic Habitat Management Unit objectives.  
 -Incidental cutting of trees may be allowed in areas not programmed for harvest on a case-by-case basis. (ex. bridge stringers).  
 -Stream Class III does not normally occur in this channel type group.

RESOURCE: Subsistence

Activity: Subsistence

NAS Code: \_\_\_\_\_

I. General Direction - Subsistence

- A. Provide for the continuation of the opportunity for subsistence uses by rural Alaska residents, including both natives and non-natives.
- B. For the purposes of identifying fish and wildlife subsistence users, the Forest will use definitions for rural and non-rural areas established by the Alaska Boards of Fisheries and Game.
- C. All Forest management activities shall be located and managed considering impacts upon rural residents who depend upon subsistence uses of the resources of national forest lands, in compliance with Section 810 of ANILCA.

Standards and Guidelines

- 1. Conduct an evaluation of proposed management activities according to Section 810 of ANILCA and the FSH Subsistence Management and Use Handbook.
- 2. Conduct notice and hearings if the subsistence evaluation and finding show that subsistence use of resources may be significantly restricted by the proposed action.
- D. Monitor subsistence uses and activities in cooperation with appropriate State and Federal agencies.
- E. In cooperation with appropriate State and Federal agencies, maintain a subsistence research program and data base.
- F. Maintain reasonable access to subsistence resources.

Standards and Guidelines

Permit appropriate use for subsistence purposes of snowmobiles, motor boats, and other means of surface transportation traditionally employed for such purposes by rural Alaska residents, subject to reasonable regulations.

- G. Allow for subsistence use of wood in traditional use areas, subject to management prescription objectives.
- H. Consult Alaska Land Use Council subsistence guidelines.
- I. Consider subsistence users needs in the scheduling, location and design of fish and wildlife habitat improvement projects.



- J. In the development of access and facilities, seek opportunities to provide for subsistence users (eg. anchorages and shelters). Such access and facility opportunities should be identified and planned with local subsistence users.

RESOURCE: Threatened, Endangered and Sensitive Species

Activity: Threatened, Endangered and Sensitive Species NAS Code: CT11

I. General Direction - Threatened and Endangered Species

Meet the requirements of the Endangered Species Act, as amended.

Standards and Guidelines

1. Utilize informal and formal consultation procedures, and conference procedures (which ever is appropriate) with the National Marine Fisheries Service and the U. S. Fish and Wildlife Service for all major construction activities and other forest management activities which may have an affect on federally listed threatened, endangered, proposed or candidate species.
2. Implement National and Regional Forest Service policy and direction for management of threatened, endangered, proposed and candidate species (Consult FSM 2670).

II. General Direction - Montague Vole Habitat Management

Provide for the identification and maintenance of Montague vole (candidate species) habitat to insure habitat protection until final determination of the status of the species is completed.

Standards and Guidelines

1. Continue with ongoing surveys of Montague vole distribution and habitat use on the Management Area.

Priority would be given to dry muskeg and uplifted beach areas prior to project implementation.

2. Design and locate development activities to minimize disturbance to identified Montague vole habitat.

III. General Direction - Sensitive Species

Implement National and Regional Forest Service policy and direction for the identification and management of sensitive species (Consult FSM 2670).

Standards and Guidelines

When population or habitat declines for a plant or animal species become of Forest Service concern, the Forest shall evaluate the particular species for approval/placement on the Regional sensitive species list by the Regional Forester.

RESOURCE: Wildlife

Activity: Wildlife Habitat Inventory

NAS Code: CW111

I. General Direction

- A. Complete a Management Area-wide habitat inventory prior to forest plan revision.

Standards and Guidelines

1. Complete the on going plant association inventory and classification for both forested and non-forested lands.
  2. Incorporate, when applicable, Forest Level Extensive Inventory (Stage I), timber stand exams and U.S. Fish and Wildlife wetland inventories.
- B. Gather adequate information to verify, improve or develop potential Management Indicator Species (MIS) habitat capability models prior to Forest Plan Revision.

Standards and Guidelines

1. Initiate surveys and inventories to identify population levels, habitat use patterns, and potential limiting factors for MIS within the Management Area. Give priority to the following:
  - a. Initiate a study to validate the Prince William Sound Sitka black-tailed deer model snow variables.
  - b. Establish baseline habitat use and season of use information for Prince William Sound Canada geese.
2. Inventories should be correlated with plant association delineations and when applicable with the Alaska Department of Fish and Game "game habitat subunits" (subunits are the land areas by which ADF&G population and harvest data is collected and summarized).

Activity: Wildlife Habitat Planning

NAS Code: CW112

I. General Direction - General Habitat Planning/Coordination

- A. Plan and develop wildlife population goals with the Alaska Department of Fish and Game for the emphasis MIS species.
- B. Cooperate with the State in regulating vehicle, boat, and other human use as necessary to achieve wildlife objectives, recognizing the access provisions of ANILCA. Emphasis for reducing human disturbance would be given to high value habitat areas and during critical periods of wildlife use.



- C. Reduce human disturbance to high value wildlife habitat areas by developing an interpretive program as necessary.
- D. Project planning would consider the habitat needs of potential Management Indicator Species consistent with the objectives of the prescription area.
- E. Initiate efforts to determine feasibility of a mountain goat introduction on Montague Island in cooperation with the Alaska Department of Fish and Game.

## II. General Direction - Sitka Black-tailed Deer Habitat Management

Provide the best possible winter range habitat condition for Sitka black-tailed deer compatible with the management objectives of the prescription area.

### Standards and Guidelines

- 1. Limit all activities that may impact deer during winter and spring where these animals remain concentrated due to deep snow conditions.
- 2. Plan and design roads to minimize impacts to wintering deer.  
  
Roads on uplifted beach should be located as far as practical seaward from upland vegetation that provides cover for wintering deer.
- 3. When planning projects, maintain large blocks of undisturbed winter range habitat where possible.

## III. General Direction - Bear Habitat Management

Implement a program (in cooperation with the Alaska Department of Environmental Conservation and Alaska Department of Fish and Game) to prevent habituation of bears to human foods/garbage and reduce chances of human/bear incidents.

### Standards and Guidelines

- 1. Require bear proof garbage facilities at all logging camps, and pack it in, pack it out requirements at overnight recreation sites, special use permits, etc.
- 2. Install bear proof food storage and refuse disposal facilities, when necessary to reduce habituation of bears, and human/bear incidents.
- 3. Disposal sites would be maintained in a sanitary condition and treated in a manner to prevent wildlife from being attracted to and/or adversely influenced by artificial supplied food sources.

4. Avoid locating new roads, trails and recreation facilities in areas that are known to have heavy concentrations of brown bear.
5. Utilize seasonal closures of roads and trails to avoid unacceptable levels of human/bear interactions.

#### IV. General Direction - Bald Eagle Habitat Management

The National significance of the bald eagle dictates that its habitat would be given special protection through specific Forest Service management measures developed in conjunction with the U.S. Fish and Wildlife Service.

##### Standards and Guidelines

1. Establish the 330 foot eagle nest zone, as specified in the Forest Plan.  

Determine the exact boundary based on local topography, timber type, windfirmness and other factors.
2. Maintain the eagle nest zone even though the nest or nest tree becomes inactive.
3. Retain trees suitable for use by eagles for nesting, feeding, roosting and perching. Consider the following:
  - a. Trees that dominate or co-dominate a shoreline.
  - b. Trees with large enough branches to support eagles.
  - c. Trees with open crowns for easy access and exit and good visibility.
  - d. Selection criteria for perch and roost trees:
    - i. Preferred: narrow fringe of mature trees immediately adjacent to the coastline.
    - ii. Spike-top trees or snags or other nonmerchantable trees.
4. Prohibit operational use of herbicides and pesticides which cause egg shell thinning or other problems in birds of prey.
5. Include special clauses and specifications in contracts, special use permits, fire wood permits, and sawtimber free use provisions that incorporate bald eagle habitat protection and management measures.

V. General Direction - Raptor Habitat Management (other than eagles)

Identify and protect any cliff areas and snag or tree that is determined to be used for nesting raptors.

Standards and Guidelines

1. Nest site and population data would be maintained in cooperation with the U. S. Fish and Wildlife Service.
2. Plan project activities to avoid adverse impacts to nesting raptors where possible.
3. Cliffs used by raptors will not be used as a rock source.
4. Roads should be located as far as practical from cliffs.

VI. General Direction - Snag/Cavity Nesting Habitat Management

Provide habitat for snag/cavity nesting wildlife species to ensure that viable populations are maintained.

Standards and Guidelines

1. During project planning, consider requirements for maintaining or creating snags over the long term.
2. Retain snags, as described in the Forest Plan, within all prescription areas allowing timber harvest. Refer to the following when planning:
  - a. Retain soft and hard snags where possible, considering safety needs for people and equipment and visual quality (e.g., snags on skyline can be removed).
  - b. Where possible, save both hard and soft snags in areas protected from wind.
  - c. Snags do not need to be evenly distributed; clumped distributions are preferred; leaving windfirm buffers around snags or groups of snags is preferred.
  - d. Snags or snag groups may be designated as wildlife trees or habitat and marked to reserve them from harvest.
  - e. Consider leaving live trees, preferably in groups, for future snag recruitment.
  - f. Consider leaving non-merchantable trees standing, especially ones that show signs of heart-rot.



## VII. General Direction - Riparian/Wetland Habitat Management

Provide for the protection and maintenance of Prince William Sound Canada Geese and other riparian and wetland wildlife.

### Standards and Guidelines

1. Minimize disturbance of geese and waterfowl by restricting, when practical, development and other concentrated human activities to periods when geese and waterfowl are absent from the area.
2. Maintain habitat capability in coastal wetlands and intertidal areas that are important migratory staging areas and fall/winter/spring concentration areas, and wetlands that are important nesting and brood-rearing habitats, by avoiding where practical all development activities which could fill wetlands, drain wetlands, or alter water levels resulting in loss of desirable vegetation, or direct loss of habitat.
3. Avoid clearing forests within 330 ft (100 meters) of geese habitat when they are present during nesting, brood rearing, molting and wintering periods.
4. Properly dispose of spoils and contaminants to assure leaching of toxic substances do not contaminate water course and wetlands.
5. Locate, design, construct and manage roads and trails to minimize adverse effects on wildlife.
6. Apply timing restraints to minerals activities as needed during critical wildlife periods.

## VIII. General Direction - Marine Mammal Habitat Management

Provide for the protection and maintenance of harbor seal, steller sea lion and sea otter habitats to minimize impacts on marine mammal haul out and concentration areas.

### Standards and Guidelines

1. Locate facilities and concentrated human activities as far from known marine mammal haul outs and concentration areas as practical.
2. Provide opportunities for viewing and interpretation.

IX. General Direction - Seabird Rookery Management

- A. Provide for the protection and maintenance of marine bird rookeries.

Standards and Guidelines

Locate facilities and concentrated human activities to minimize impacts on known seabird colonies.

- B. Provide opportunities for viewing and interpretation.

Activity: Monitoring

NAS Code: CW121

I. General Direction

Conduct monitoring programs of all MIS or their habitats to determine the effects of implementing the approved projects.

Standards and Guidelines

1. MIS populations and/or habitats would be monitored as described in the MIS monitoring Plan (Appendix C).
2. Conduct on-the-ground assessments of the implementation of activities which have the potential to effect wildlife habitat to determine if objectives were met.
3. Monitor selected wildlife habitat rehabilitation, mitigation, and enhancement projects to determine if projects objectives have been met.

Activity: Wildlife Habitat Improvement

NAS Code: CW22

I. General Direction

Design precommercial thinning activities to encourage rapid growth and early development of habitat characteristics (large branches to intercept snow and an open canopy to promote understory forage development) in high value deer winter ranges compatible with the management objectives of the prescription area.

RESOURCE: Timber

More detailed standards and guidelines are found in R-10 Forest Service Handbooks 2409.26d - Silvicultural Examination and Prescription Handbook, 2409.18 - Timber Resource Planning Handbook, and 2409.24 - Timber Sale Preparation Handbook. These handbooks are updated regularly to reflect current management techniques and practices.

Activity: Silvicultural Examination and Prescription NAS Code: ET111-2

I. General Direction - Stage II Intensive Inventory

- A. Silvicultural examinations including stocking surveys will be conducted as part of Forest Plan implementation.

Standards and Guidelines

Stocking survey priorities in order of importance are:

Stands on Montague Island scheduled for precommercial thinning.

- B. Written silvicultural prescriptions are required for all proposed resource management activities where vegetative manipulation of the forest is involved and will be accomplished as part of project planning during Forest Plan implementation.

Standards and Guidelines

1. A certified silviculturist will prepare or approve a detailed silvicultural prescription for all stands scheduled for silvicultural treatment (logging, site preparation, planting, precommercial thinning, etc.)
2. The prescription will be based on a recent silvicultural examination of the stand, sound silvicultural practices, and management objectives and direction for the area.
3. Concentrate timber sales in stands that have high silvicultural priority for a harvest treatment.

Activity: Timber Resource Planning NAS Code: ET112

I. General Direction

Provide timber resource information necessary to prepare projects and for Forest Plan revision. This includes maintenance of resource photos, maps, inventories, analysis of data, and updating the spatial timber data base with the most current information from the above data sources.



### Standards and Guidelines

1. The District Timber Management Assistant is responsible for providing all timber information resulting from current inventories, sale layout, or other vegetative management activities to the Forest timber planner.
2. The Forest timber planner is responsible for updating the Forest's spatial and other timber reporting data bases with the most current timber information.

Activity: Timber Resource Coordination

NAS Code: ET113

#### I. General Direction

Technical support from other resources is required to insure that the timber program identified in the Forest Plan is implemented.

### Standards and Guidelines

The annual district timber program will identify what technical support will be necessary from other resource programs for the design and location of proposed activities; the administration of on-going activities; and to monitor the effects of completed activities.

Activity: Timber Sale Preparation

NAS Code: ET114

#### I. General Direction

- A. Layout harvest units to allow the greatest variety of logging equipment and logging systems to harvest the timber and meet specified resource protection standards.
- B. Analyze blowdown hazard for all sales and design cutting unit boundaries to minimize windthrow potential.
- C. Locate and design harvest units using landscape management techniques.
- D. Design harvest units and temporary roads to protect existing regeneration in adjacent second growth stands.
- E. Harvest units and roads should be located to facilitate future intensive management.

### Standards and Guidelines

1. Locate harvest units to reflect the overall harvest plan.
2. Leave any trees that will be needed for guyline and tailtree anchors, or lifttrees on future units in subsequent entries; if stumps are to be used, consider time between sales.

## II. General Direction - Harvest systems

- A. Stand clearcutting is the preferred harvest system.
- B. Optionally, use individual tree or group selection for salvage cutting.
- C. Use individual tree, group selection, shelterwood cutting, or strip clearcutting in Aquatic Habitat Management Units and for harvest in prescribed areas where timber is removed to enhance or attain other resource management objectives.
- D. Where prescribed in the management area, the objective of strip clearcutting is to harvest and regenerate the stand in two entries while maintaining 50 percent of the stand for deer winter habitat during the initial entry.

### Standards and Guidelines

- 1. Harvest strips should not exceed a horizontal width of 300 feet.
- 2. Leave strips should have a minimum horizontal width of 300 feet.
- 3. Harvest strips should run perpendicular to streamcourses to the extent practicable.
- 4. Require felling to the lead in strips to be harvested.
- 5. Layout harvest strips to ensure windfirm boundaries.

## III. General Direction - Salvage Harvest

- A. Salvage cutting is the harvesting of individual dead or dying trees (trees not expected to live another 20 years) wherever they may occur, provided there is no management prescription limitation.

### Standards and Guidelines

- 1. Salvage trees damaged in road construction.
- 2. Salvage mortality and blowdown as it occurs where little or no additional road construction will be necessary to reach damaged timber.
- B. Trees salvaged in a prescriptive area excluded from scheduled timber harvest (unsuitable forest land) will not be included as chargeable volume to the allowable sale quantity. These lands will not be substituted for suitable forest land.

- C. Beach log salvage often involves both State and National Forest system lands. A Memorandum of Understanding between the State of Alaska and the Forest Service on coordination of beach log salvage, dated April 23, 1980, will provide direction.

Standards and Guidelines

1. The State and Forest Service will make combined beach log salvage sales. The party with the largest share of material will sell and administer the sale.
  2. Beach logs are considered excess and may be exported.
  3. Beach logs that are not merchantable will be utilized for personal use whenever possible.
- D. Beach log salvage material is not included in the growth and yield projections of the Forest Plan and is not chargeable to the annual allowable sale quantity.

Activity: Timber Resource Monitoring

NAS Code: ET121

I. General Direction

Timber resource monitoring will be accomplished in accordance with the guidelines in the Forest Monitoring Plan.

Activity: Reforestation Certification

NAS Code: ET121-1

I. General Direction

- A. Monitor areas that have been planted or seeded to insure management objectives have been met as directed in the Forest Monitoring Plan.

Standards and Guidelines

1. Certify that a planted or seeded area has attained a stocking level above a defined minimum in terms of number and distribution of acceptable species, whether planted, seeded, or natural.
2. Before an area of reforested land may be certified as satisfactorily stocked, the re-established tree seedlings must have survived and be thriving three or more full growing seasons after planting, seeding, or natural regeneration.



Activity: Timber Stand Improvement Certification

NAS Code: ET121-2

I. General Direction

Monitor areas that have received precommercial thinning or release and weeding treatments to insure management objectives have been met as directed in the Forest Monitoring Plan.

Standards and Guidelines

Certify that the treatment met the objectives of the silvicultural prescription. In the case of thinning, it normally means certifying that the stocking of desired residual trees meets prescribed standards.

Activity: Commercial Sale Administration

NAS Code: ET122

I. General Direction

- A. Administer timber sale contract provisions, post sale measurement, and financial oversight of all sales.

Standards and Guidelines

1. Frequency of timber sale inspection will be determined by the complexity of the timber sale and operator performance, with the objective being to ensure full contract compliance.
2. In prescriptive areas where other resource values are emphasized, the sale administrator will work with the appropriate resource specialist(s) (wildlife biologist, fisheries biologist, landscape architect, recreation specialist, etc.) to ensure that the project goals are met.

Activity: Reforestation

NAS Code: ET24

I. General Direction

Natural regeneration should be used to reestablish desirable tree cover after deforestation, wherever possible.

Standards and Guidelines

Prescribed burning can be used for preparing sites for planting, seeding, and for other resource needs. It may also be used for fuel management, when the wood residue cannot be used for other purposes.

I. General Direction

- A. Manage stands to improve species composition, overall stand health and growth rates.

Standards and Guidelines

1. Tree spacing will be based on the objectives of the prescriptive area.
2. Prioritize second growth stands according to stand site index and other resource objectives such as wildlife and visuals, thinning stands with the highest site index first.
3. Favor dominant or selected species that are more or less evenly distributed over the stand by removing a varying proportion of the other trees.

RESOURCE: Soil and Water

Activity: Watershed Resource Planning

NAS Code: FW112

I. General Direction

- A. Plan and conduct land use activities to avoid irreversible effects (Cumulative Watershed Effects) on the soil and water resources, and to maintain water of quality and quantity sufficient to maintain beneficial uses.

Work cooperatively with other Forest resource groups, State, Federal and Local government agencies and Native American corporations for the protection, mitigation, and/or enhancement of the water and soil resources.

Standards and Guidelines

1. Apply Process Best Management Practices (BMPs) or applicable Standard BMPs to projects, to provide non-point water quality protection to meet federal, state and local water quality requirements.
  - a. Process BMPs refer to custom fit practices, measures or methods developed for projects through inventory and analysis, and interdisciplinary involvement.
  - b. Standard BMPs are established (fixed) methods, or measures that are applied to projects.
2. Project plans for all projects with soil disturbance will include erosion/stabilization measures.
3. Delineate on appropriate project area maps the location of soil and water protection areas to insure their recognition, proper consideration, and protection.

Activity: Watershed Resource Administration

NAS Code: FW12

I. General Direction

- A. Manage non-designated domestic use watersheds to maintain water suitable for human consumption within the realm of State water quality standards and water supply regulations. Consult State Water Quality Standards (18 AAC 70.020).

Standards and Guidelines

1. Identify appropriate soil and water quality standards before implementation of project-level activities.



- B. Manage activities on wetlands (including estuaries and tidal meadows), floodplains, and riparian areas to avoid adverse soil and water resource impacts.

Standards and Guidelines

1. Minimize implementation of land use disturbance activities on wetlands.
2. Conduct all activities on wetlands and riparian areas in accordance with Draft Best Management Practices (BMP).
3. Refine wetland data and interpretation maps as needed on a case-by-case basis for project planning.
4. Seek cooperation from State and Federal agencies having overlapping resource management responsibilities for these land classifications. Execute plans and decisions in a manner consistent with the statutory responsibilities of these agencies.
5. Monitor and regulate human use on wetlands to eliminate adverse affects.
6. Regulate off-road vehicle use to prevent degradation of habitat or adverse disturbance of wildlife populations.
7. Minimize human disturbance of habitats and protect wetland vegetation during critical periods of the year (nesting and brood-rearing, molting, and winter) by regulating human use.
8. Design and implement projects to have a minimum impact on fish and wildlife and their habitats.

Activity: Watershed Resources Monitoring

NAS Code: FW121

I. General Direction

- A. Monitor land disturbing activities to determine effects of these activities on soil productivity & erosion, water quality and quantity. Monitor soil and water at three distinct monitoring levels consisting of:
1. implementation - document how plans or BMPS are implemented as designed
  2. effectiveness - evaluate if plans or BMPs are effective in meeting management objectives
  3. validation - validate the appropriateness of standards and model coefficients

Consult FSM 2520 and 2530, R-10 Water Quality Monitoring handbook, and State Water Quality Standards

## Standards and Guidelines

1. At project planning and implementation levels ensure each specific monitoring level described in "A" above includes the following items. (FSM 2525).
  - a. The monitoring objective.
  - b. The Rationale behind each of the parameters and evaluation criteria.
  - c. Who is to be involved and their roles and responsibilities.
  - d. What parameters will be monitored and evaluated.
  - e. When, where, and how often monitoring will occur.
  - f. What methodologies and sampling techniques will be used for monitoring evaluation and analysis.
  - g. How will results be interpreted and reported.
2. Select projects to monitor and evaluate the results of BMPs on soil and water resources to prevent and reduce non-point water pollution.
3. For each project develop a non-point source monitoring plan that tracks and records:
  - a. identification of the land disturbing activities
  - b. design of BMPs
  - c. application of BMPs
  - d. monitoring
  - e. effects reporting
  - f. any correction actions required
  - g. feedback to BMP designs
4. Cooperate and participate with the State of Alaska through the Water Quality Cooperative Agreement to identify and monitor non-point source pollution, and implementation and effectiveness of BMPs.
5. Monitor soil disturbance and/or water quality when management activities remove vegetation or disturb the surface mineral soil.

6. Monitor annually all watershed improvement projects until final evaluation of the projects indicates that maintenance is no longer needed.

Activity: Watershed Resource Improvement

NAS Code: FW2

I. General Direction

- A. Protect or improve water quality and and soil productivity.

Standards and Guidelines

1. Conduct Watershed Condition Surveys(WCS) to determine the improvement needs in the watershed improvement plan. Consult FSM 2510 and 2520.
2. Complete a watershed improvement plan for all watershed improvement projects prior to project implementation. Consult FSM 2520.
3. Use the Forest Watershed Improvement Needs Inventory (WINI) for identification and prioritization of treatment to soils, stream banks and channels. Consult FSM 2510.
4. Maintain WINI reports to provide information for current year budgets, outyear budgets (next two years) and RPA.
5. Give priority to treatment of soil sites, stream banks and channels with the highest erodible conditions directly affecting fish and water resources.
6. Whenever possible, use indigenous plants and materials for revegetation.
7. When appropriate, use plants to benefit wildlife.



RESOURCE: Minerals and Geology

Activity: Minerals and Geology Administration

NAS Code: GM12

I. General Direction - Forest lands open to mineral entry

- A. Encourage the exploration, development, and extraction of locatable and leasable minerals and energy resources.
- B. Permit reasonable access to mining claims in accordance with the provisions of an approved plan of operations.

II. General Direction - Forest lands withdrawn from mineral entry

- A. Claimants with claims located in areas withdrawn from mineral entry retain valid existing rights if such claims were located prior to the withdrawal date.
- B. Conduct on the ground validity examinations by a qualified minerals examiner to establish or reject valid existing rights on active mining claims within withdrawn areas.
- C. Permit reasonable access to mining claims in accordance with the provisions of an approved plan of operations.

III. General Direction - Plan of Operations

- A. A Notice of Intent and/or a plan of operations is required for locatable, leasable, and saleable minerals. (Consult FSM 2810, 2820, 2850, and 36 CFR 228)

Standards and Guidelines

- 1. A plan of operations will receive prompt evaluation and action within the timeframes established in 36 CFR 228.
- 2. Conduct an environmental analysis for all operating plans and prepare appropriate NEPA documentation.
- 3. Operating plans will include provisions for reclamation.
- B. Work with claimants to develop a plan of operations that mitigates to a reasonable extent adverse impacts to the management area. The following management practices may be applied as appropriate to reduce resource impacts.

Standards and Guidelines

- 1. Take advantage of topographic and vegetative screening when locating drill rigs and pumps, roads, rock quarries, structures, and marine transfer facilities

2. Locate material sites and marine transfer facilities outside of sensitive areas if reasonable alternatives exist.
3. Apply timing restrictions to in stream construction as needed to protect fisheries habitat and mitigate adverse disturbance of stream sediments.
4. Use sedimentation traps as needed to mitigate adverse stream sedimentation.
5. Revegetate disturbed areas with local vegetation within 1 year to restore and promote future wildlife habitat and to hasten meeting the Visual Quality Objective. .
6. Design reclamation plans so mineral activities leave a natural appearing condition.
7. Quarry back walls visible from sensitive travel routes should be reduced in height and/or designed to have an irregular back line.
8. Haul away, bury , burn or scatter vegetation removed from the project area when located adjacent to sensitive roads.
9. Minimize the scale of spoil/disposal areas in relation to the surrounding landscape as seen from sensitive view points.
10. Utilize colors that simulate those found in the characteristic landscape. Except when warranted by safety considerations avoid use of reflective materials in project facilities.
11. Apply timing restrictions to minerals activities as needed during critical wildlife mating, hatching, and migrating periods to minimize adverse impacts to wildlife..
12. Coordinate the location of forest transportation systems with mining transportation systems when practical.
13. Coordinate with claimants to ensure the location of timber sale units and roads or special use authorizations do not interfere within mining activities, markers, and improvements.

#### IV. General Direction - Bonds

Require reclamation bonds to ensure completion of site reclamation for locatable, leasable, and saleable mineral operations. (Consult 36 CFR 228)

V. General Direction - Mineral Materials

- A. Permit mineral material sites only after an environmental analysis assures other resources are adequately protected, and the site location and operating plan are consistent with the management area emphasis. Require bonds and reclamation. (Consult FSM 2850 and 36 CFR 228)
- B. Where the opportunity exists, design, excavate, and reclaim material sites to facilitate their use for dispersed recreation or other desirable uses such as conversion to salmonid rearing ponds and spawning channels.

VI. General Direction - Monitoring

Complete compliance inspections on a frequency schedule commensurate with the complexity and sensitivity of the project.

Standards and Guidelines

Complete one compliance inspection per year as a minimum for each approved plan of operation.



RESOURCE: Lands

Activity: Lands Preparation

NAS Code: JL11

I. General Direction - Land Status

Perform a thorough land ownership review during early project planning stages, to ensure protection of State, private, and other Federal Agency rights and interests.

Standards and Guidelines

Consult resources, such as BLM Master Title Plats (MTP's), in addition to the land atlas, to identify land encumbrances which do not appear in the land atlas.

II. General Direction - Coordinating with Others

- A. Coordinate activities on National Forest System land with adjacent State and private landowners, through the NEPA process. Solicit and consider their input when analyzing proposes which might affect them. Utilize State of Alaska Prince William Sound Area Plan and available private landowners plans.
- B. Coordinate, in accordance with the Memorandum Of Understanding, all projects which have a direct effect on the coastal zone. Consultation will be with Alaska Office of Management and Budget, Division of Governmental Coordination, to ensure activities are consistent, to the maximum extent practicable, with the Alaska Coastal Zone Management Program. The Coastal Zone excludes all Federal lands.
- C. Coordinate activities on encumbered lands with interest holders, as appropriate.

Activity: Special Use Administration (non-Recreation)

NAS Code: JL122

I. General Direction - General

- A. Manage special use authorizations to best serve the public interest, in accordance with the following standards and guidelines. (Consult 36 CFR 251)

Standards and Guidelines

- 1. Do not authorize private uses of National Forest System lands when such uses can be reasonably accommodated on other lands. (Consult FSM 2700)
- 2. Review new requests for compatibility with management area prescriptions, based on a consideration of environmental values, economic feasibility, and a determination of social and economic benefits. (Consult FSM 2700 and the Alaska Regional Guide)

3. Review and adjust special use fees on a planned basis to comply with the Federal Land Policy and Management Act and Forest Service policy. (Consult the Alaska Regional Guide and FSM 2700)
4. Upon renewal or transfer of a permit, terminate or bring into conformance, existing uses which are not compatible with the Forest plan or with the purposes for which the area was established.
5. On lands selected by State and Native Corporations, obtain concurrence from the appropriate entity, in accordance with the Alaska National Interest Lands Conservation Act, Section 906 (k) and Forest Service Manual Policy. (Consult FSM 5450)
6. Coordinate all special use permit proposals which have a direct effect on the coastal zone, with Alaska Office of Management and Budget, Division of Governmental Coordination.
7. Require that structures be designed, constructed and maintained in a manner to blend with the surrounding environment, and be consistent with management objectives and other allowed activities.
8. Manage authorized uses to maintain a neat and sanitary condition of the permit area.

## II. General Direction - Cabins and Related Structures

- A. Manage cabins and other structures, in accordance with the following standards and guidelines.

### Standards and Guidelines

1. The construction of new cabins is prohibited with the following limited exceptions. A nontransferable, five-year special use permit may be issued in some circumstances, following a determination that: (1) the proposed use, construction, and maintenance of the cabin are compatible with management area objectives; (2) use of the cabin is directly related to administration of the area or is necessary for continuation of an ongoing activity, allowed within the area; and (3) the permit applicant has no reasonable alternative.
2. Do not permit construction of new cabins for private recreational uses or residential uses.

### III. General Direction - Temporary Facilities

- A. A temporary facility is defined as: "Any structure or other man-made improvement which can be readily and completely dismantled and removed from the site when the authorized use terminates". (Consult FSM 2721.14 (R10 Supp. 46))
- B. Permit temporary campsites, tent platforms, shelters, and other temporary equipment, directly and necessarily related to the taking of fish and wildlife, subject to reasonable regulation to ensure compatibility, conditions of the Alaska National Interest Lands Conservation Act, Section 1316, Forest Service manual direction, and consistency with management prescription direction. (Consult FSM 2721.14 R10 Supp 46).

### IV. General Direction - Aquaculture and Mariculture Permits

- A. Cooperate with State and other Federal Agencies to meet industry and public needs for aquaculture/mariculture programs and ensure compatibility with other resources and activities.

#### Standards and Guidelines

- 1. In reviewing proposals for aquaculture and mariculture adjacent to NFS and other conflicting activities, such as recreation uses and access to adjacent uplands.
- 2. Coordinate review of aquaculture and mariculture proposals with Alaska Department of Natural Resources and Alaska Office of Management and Budget, Division of Governmental Coordination.
- 3. Initially, issue permits only for low investment, minimum development, temporary, support facilities which can be readily moved from the site if the project ceases to be viable for the operator.

### V. General Direction - Floathouses

- A. Manage residential floathouses in accordance with the following standards and guidelines.

#### Standards and Guidelines

- 1. Issue special use permits for floathouses shoreties only at locations where the activity is specifically provided for in the Alaska Coastal Zone Management Plan or approved coastal zone area plans.
- 2. Cooperate with the State of Alaska and local communities to help develop criteria which address floathouse placement. In developing new State or city plans, encourage locating floathouses near communities or adjacent to private uplands.



3. As a condition of the Forest Service special use permit, require applicants to obtain all necessary authorizations from other appropriate Agencies, such as Alaska Department of Natural Resources and the Army Corps of Engineers.

#### VI. General Direction - Fish Camps

- A. Apply the following standards and guidelines to permits for commercial set net fish camps.

##### Standards and Guidelines

1. Where the use of commercial fish camps, including primitive cabins, is a customary and traditional use, allow this use to continue within traditional locations, at approximately traditional densities, as established prior to ANILCA (December 2, 1980), if compatible with management area objectives.
2. New facilities would usually be tent platforms and associated temporary facilities unless a need can be demonstrated for a cabin.
3. New cabins, if authorized, would not exceed 500 square feet in size. Limit new cabin authorizations to one cabin per setnet permit. If needed, authorize additional sites for use with a tent platform. If authorized, new cabins would become the property of the United States Government, as provided in the Alaska National Lands Conservation Act, Section 1303(b)(4).
4. Assign a permit tenure of one to five years for tent platforms.
5. Assign new fish camp permit holders areas up to 1/4 acres in size, based on need. Locate camps in groups to limit impacts to other areas.
6. Within areas traditionally used for fish camps, do not authorize new non-related special uses, other than uses associated with subsistence. Allow existing privileges currently under permit, to continue. Do not allow fish camp permit holders to engage in other commercial activities from their fish camps, such as outfitter/guide or lodge/resort activities, unless already authorized by permit.
7. Consider authorizing requests for subsistence uses for commercial fish camps; however, any authorization for subsistence uses from fish camps would be documented in writing to the permit holder, along with conditions, if any, which may be necessary to protect resources and the rights of other users. Do not permit residential uses of fish camps.

8. To obtain a fish camp permit, require applicants to hold a commercial set net permit from Alaska Department of Fish and Game, valid for the area in which the proposed facility is to be located. Camp occupancy would generally correspond to the dates of the open set net season, with exceptions allowed for camp set up and take down (if necessary) and for subsistence uses, if authorized.
9. In compliance with the Federal Land Policy and Management Act, and Federal Regulations (36 CFR 251.57), assess appropriate fees in conjunction with all commercial fish camp uses.
10. Natural hydrologic changes may lead to use areas being relocated. This need is recognized and new use areas may be authorized, if necessary, following separate environmental analysis, as rivers change their course or other changes lead to shifts in the location of fish runs. Issue permits for tent platforms in new locations where cabin use is not already established.

#### VII. General Direction - Right-of-Way Grants

- A. Grant reasonable access across National Forest System land to allow inholders and other land owners use of their land without unnecessarily reducing Forest Service management options or damaging National Forest lands or resources. (Consult FSM 2730)

##### Standards and Guidelines

1. Accommodate new transportation and utility proposals within existing corridors, to the maximum extent feasible. (Consult 36 CFR 219)
2. Transportation analysis will be completed for an area before any permit is issued, to ensure that all roads constructed through permits or leases are coordinated with a transportation plan for the area.

- B. Allow the following activities to occur without requiring a special use authorization. (Consult Section 1110(A), ANILCA)

##### Standards and Guidelines

1. Allow the use of snowmachines, motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities which are permitted by law and for travel to and from villages and homesites, subject to reasonable regulations to protect resource values.
2. These uses do not require a permit and may be restricted following a NEPA disclosure.

3. This direction does not authorize the construction or maintenance of improvements or facilities on National Forest System lands, nor does it authorize use of off-road vehicles, other than snowmobiles.

Activity: Land Ownership Administration

NAS Code: JL123

I. General Direction - Land Selections

- A. Management decisions, will consider valid State selections (pursuant to the Alaska Statehood Act), and Native selections under ANSCA and ANILCA as amended. Apply the following standards and guidelines to Management Areas encumbered, until these lands are either conveyed into State or private ownership, or they revert back to unencumbered National Forest System land.

Standards and Guidelines

Avoid Forest Service investment projects on lands encumbered by State selections, Native withdrawals or selections, or Native Allotment applications.

- B. Manage State selections, entered under authority of the Alaska Statehood Act, according to the following standards and guidelines. (Consult 43 CFR 2627)

Standards and Guidelines

1. Work with State agencies and local communities to substantially eliminate Forest ownership in and adjacent to communities where State, borough, or community governmental jurisdiction should logically preside.
  2. Obtain concurrence from Alaska Department of Natural Resources prior to granting any occupancy permit or contract on selected lands, in accordance with the Alaska National Interest Lands Conservation Act, Section 906(k) and Forest Service Manual policy. (Consult FSM 5450)
- C. Apply the following standards and guidelines to Management Areas encumbered by Native selections or withdrawals, made under authority of the Alaska Native Claims Settlement Act (ANCSA), as amended, until these lands are either conveyed into private ownership, or they revert back to unencumbered National Forest System land. (Consult 43 CFR 2650)

Standards and Guidelines

1. Do not issue occupancy permits, contracts, easements, or similar authorizations on lands selected, or withdrawn for selection, by a Native corporation under authority of ANCSA, without consent from that Native corporation, unless permission is first obtained from the Regional Forester. (Consult FSM 5450)



I. General Direction - General

- A. Apply the following standards and guidelines when maintaining established National Forest property boundary lines and corners, or when locating, surveying, and posting new National Forest property boundaries and corners.

Standards and Guidelines

1. These boundaries should not be surveyed, marked or posted, until after conveyance of the land.
2. Coordinate with BLM for original boundary line survey. Encourage cooperative work with BLM to mark and post original National Forest/State and National Forest/Native boundaries to Forest Service standards.
3. Maintain an inventory of surveyed and unsurveyed boundary lines to establish survey priorities. Establish program priorities to coincide with Forest Service manual direction. These priorities are identified, by location, in the Forest Plan schedule and would be updated periodically. (Consult FSM 7150)

I. General Direction - Rights-of-Way Acquired

- A. Acquire, across non-National Forest System land, road and trail rights-of-way which are adequate for the protection, administration, and utilization of the Chugach National Forest. (Consult FSM 5460)

Standards and Guidelines

1. Generally, acquire rights-of-way identified in project plans at least one year prior to schedule activity.
2. Generally, acquire unlimited easements, granted in perpetuity. Limited easements (e.g., those authorizing administrative use, but not public use) may be acquired only when public use is not desirable.
3. Encourage the use of cost share agreements when practicable, to avoid economic and resource impacts associated with duplicate road systems.
4. Monitor compliance with stipulations of existing rights-of-way.

5. Identify and request all needed rights-of-way across lands selected by the State or Natives, as provided by Federal law.
  6. Secure adequate rights-of-way before issuing contracts or constructing facilities in intermingled landownerships. (Consult FSM 5400)
- B. Acquire log transfer facility (LTF) authorizations on adjacent tidelands in accordance with the following standards and guidelines.

Standards and Guidelines

1. Coordinate LTF activities (location, construction, operation, etc.) with the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Alaska Department of Natural Resources, Alaska Office of Management and Budget, Division of Governmental Coordination, Alaska Department of Fish and Game, Alaska Department of Environmental Conservation, local communities, and adjacent landowners, as appropriate.
2. Ensure LTF activities are consistent, to the maximum extent practicable, with the Alaska Coastal Zone Management Program.
3. Acquire long term easements (preferably at least 25 years) for permanent LTF sites.

Activity: Land Ownership Adjustments

NAS Code: JL26

I. General Direction - General

- A. Land adjustment decisions would be based on the Forest Plan identification of lands suitable for disposal or acquisition. Consider proposals for lands not identified in the Forest Plan, on a case-by-case basis, using the following criteria. (Consult FSM 5400)

Standards and Guidelines

1. Work cooperatively with the State of Alaska and Native Corporations to improve land ownership patterns and management opportunities resulting from State and Native land conveyances.
2. Retain National Forest System land which best serves the public interest in Federal ownership.

3. Consolidate National Forest System lands, when practicable. Attempt to reduce miles of property boundary lines and number of corners, to locate and maintain.
4. Generally, acquire and dispose of land with as few reservations and outstanding rights as possible. (Consult FSM 5420, 5430, and 5470).
5. Avoid separating the surface and subsurface estate, unless it is clearly in the public interest. (Consult FSM 5430)
6. Pursue land adjustments that reduce administrative costs or increase the output of goods and services. Avoid land adjustments that do not enhance Forest Service programs. (Consult FSM 5430)
7. Generally, pursue land exchanges on an equal value basis. Exchanges may be made for other than equal value if the parties agree and the exchange is determined to be in the public interest, as provided in Section 1302(h) of the Alaska National Interest Lands Conservation Act and Section 22(f) of the Alaska Native Claims Settlement Act, as amended. (Consult FSM 5430)

## II. General Direction - Acquisition

- A. Apply the following standards and guidelines for land acquisition activities.

### Standards and Guidelines

1. Acquire isolated inholdings at critical locations if public benefits would occur.
2. Within Congressionally designated areas, such as Wilderness, acquire private inholdings as opportunities permit. Wilderness inholdings are priority acquisitions until after the State and Native selection process is completed.
3. Within administratively designated areas, such as scenic area, generally acquire private inholdings, as opportunities arise.
4. Acquire private lands necessary for efficient management of the Forest.
5. Generally, acquire lands by exchange with willing landowners. Purchase lands only when exchange is not practicable.



### III. General Direction - Disposal

- A. Apply the following standards and guidelines for land disposal activities.

#### Standards and Guidelines

1. Do not exchange National Forest System lands selected by the State of Alaska, or a Native corporation, or lands under Native allotment application, which have not yet been conveyed, unless specifically provided for in legislation. If the party holding the encumbrance desires ownership adjustments, they may relinquish their selection. The Forest Service may then pursue land ownership adjustment, if otherwise appropriate.
2. Dispose of National Forest System lands which would best serve the public interest in private ownership, provided the action would not decrease ability to meet National Forest System management objectives. Examples may include: (1) isolated small parcels which are impractical to manage, (2) parcels where a greater general public value can be derived in private ownership, and (3) areas necessary for community expansion. (Consult 36 CFR 254)
3. Avoid exchanging National Forest System lands occupied under permits or easements unless the non-Federal owner and the permittee reach agreement on the disposition of existing uses. (Consult FSM 5430)
4. Within Congressionally designated areas, such as Wilderness, retain existing National Forest System lands. Within administratively designated area, such as a Scenic Area, generally retain National Forest System land, unless there are compelling reasons for disposal.

RESOURCE: Access

Activity: Transportation System Inventory

NAS Code: LT111

I. General Direction (FSM 7710.32)

Maintain an inventory of all forest development transportation facilities, including roads, bridges and major culverts, trails, log transfer facilities, air strips, and salt water access points. Incorporate FSM 7710.32 items 1,2,3 and 4.

Standards and Guidelines (FSM 7711.1)

Use the Primary Base Series maps at 1:63360 scale to portray the transportation system. Also use and develop a data management inventory system that allows for the storage and manipulation of the information. The present data base in use for roads is the national Transportation Information System (TIS). Incorporate FSM 7711.11 and 7711.12.

Activity: Transportation Monitoring

NAS Code: LT121

General Direction - Traffic Surveillance (FSM 7731.51)

Collect data about traffic volume and types on forest development roads. As a minimum, collect data necessary to determine investment sharing and commensurate maintenance responsibilities.

Activity: Road and Bridge Administration

NAS Code: LT122

I. General Direction - Road Management (FSM 7731)

Forest development roads are not public roads (FSM 7705) in the same sense as roads that are under the jurisdiction of public road agencies, such as States or boroughs. Through authorities delegated by the Secretary, the Forest Service may restrict or control use to meet specific management direction. Commercial users, permittees or contractors also may be required to share in the cost of developing, improving and maintaining forest development roads.

Standards and Guidelines - Road Management

- A. Allow administrative use of closed or restricted roads when needed for emergency use or otherwise deemed appropriate by the Forest Supervisor.
- B. Road Management Objectives shall be approved by a Line Officer and shall specify road specific standards and guidelines.

II. General Direction - Permitting (FSM 7731.16 R-10 Supp 38)

Require road use permits for commercial use of all Forest development roads. Operate users under the provision of a road use permit for the commercial share of their operation when users are transporting both National Forest products and commercial products on Forest development roads.

Incorporate by reference all sections in FSM 7731.16 R-10 Supp 38.

III. General Direction - Investment Sharing (FSM 7731.3 R-10 Supp 36)

Require investment sharing in the road system by users of Forest Development Roads for commercial hauling of non-Federal products, commodities or materials when feasible. Performance of offsetting work by the cost-sharing party(ies) is generally preferred as the method of payment.

Incorporate by reference all sections FSM 7731.3., FSM 7731.3 R-10 Supp 36 and FSM 5467.

Activity: Transportation Planning

NAS Code: LT212

I. General Direction - Road Management Objectives (FSM 7712.31)

Establish the specific intended purpose (FSM 7701 item 7), based on management direction, of the new project or projects. Document this purpose by developing a road management objective that contains design criteria (FSM 7720) and operation and maintenance criteria (FSM 7730.3). The document shall be approved by a line officer prior to any construction activities, and retained as a permanent record. Document arterial and collector roads individually; however, similar local roads may be grouped on one document. Before the year 1990 establish and document the road management objective for the existing roads in the system showing operation and maintenance criteria.

II. General Direction - Trail Planning

A. Provide a variety of recreation opportunities by developing trails that emphasize the following:

Standards and Guidelines

1. Link trails with future road systems.
2. ATV trail systems utilizing future roads.
3. Hiking on loop trails.
4. Access to recreation features and facilities; especially providing access to alpine areas; including the provision of access through private lands to adjacent National Forest System lands (easements through Native lands).



- B. Develop trails to a standard commensurate with the level of anticipated use and ROS setting. Trails developed to provide access through private land to National Forest System land will generally be developed as primitive trails. These trails usually will not require tread construction but will be cleared of brush and include route marking. Marking may consist of tree blazing, various route markers, rock cairns, or other techniques.

Activity: Preconstruction Engineering

NAS Code: LT214

I. General Direction - Location and Design

- A. Perform route or site selection, location, geotechnical investigations, survey, and design to a technical level sufficient for the intended use of the facility, the investment to be incurred, and the affected resource values. (FSM 7720.31)
- B. The following factors will be used for determining road standards:
  - 1. Cost of transportation (including operation and maintenance)
  - 2. Safety.
  - 3. Impacts on land and resources.
  - 4. (FSM 7721.1, incorporate by reference FSM 7721.1 not recited above).
- C. Design the road system to serve the projected traffic requirements designated in the Road Management Objectives at the lowest cost for transportation (lowest total construction plus maintenance plus user costs). (FSM 7721.13)
- D. Consult the Forest Service Road Preconstruction Handbook (FSH 7709.56) for detailed location and design guidance.
- E. Construct and design roads to conform to the Adopted Visual Quality Objectives.

Standards and Guidelines

- 1. Incorporate erosion control and stabilization measures in project plans for stabilizing roads, landings, skid trails and other human-caused soil disturbances.
- 2. Locate stream crossings in stable reaches, unless appropriate mitigation measures are taken. Design crossings of v-notched drainages to prevent debris jamming. Culvert gradient should follow natural gradient for non-fish bearing streams where needed to prevent downstream erosion. Require bridge brow logs for log stringer bridges to contain bridge surfacing materials and prevent entry of sediment into the stream.

3. Sidecasting of waste materials must not encroach upon the stream course and as much undisturbed ground cover as practicable shall be left between the road and the stream. Complete endhaul of waste material will be required where roads are located near fish streams when there is the probability of downhill movement of the material into the stream below.
4. Meet fish passage direction at all crossings. Contracts will specify permissible uses of heavy machinery and the timing of road construction activities. Alaska Region Report Number 42, Roadway Drainage Guide for Installing Culverts to Accommodate Fish shall provide direction for providing fish passage at crossing sites.
5. Drainage ditches along the road bed should be sloped with reasonable consistency to the nearest culvert and should avoid leading directly into stream channels.
6. Incorporate applicable Standards and Guidelines for other resources during the planning and design phases for the transportation facility.

## II. General Direction - Wetlands, Floodplains, Estuaries, Tidal Meadows

- A. Locate and design forest development roads to minimize impact to soils, water, and associated resources in accordance with Executive Order 11988 and 11990 (Floodplain Management and Protection of Wetlands).

Activity: Quarry and Borrow Sites

NAS Code: LT214

### I. General Direction - Quarry and Borrow Sites

All pits and quarries shall be approved in writing by the Forest Service prior to exploration, clearing or development. Design pits and quarries to meet visual quality objectives.

#### Standards and Guidelines

1. All overburden shall be removed to solid rock for a minimum distance from the working face. The minimum distance shall be shown in the Pit and Quarry Development Plans. Adjacent to primary travel routes and public use areas, overburden shall be stockpiled, respread, and seeded upon completion of the borrow excavation, whenever possible.
2. The cutbank of overburden shall be sloped to the natural angle of repose. In no case shall the slope be greater than the steepest limit shown in the Pit and Quarry Development Plans.

3. Within clearing limits:
  - a. Maximum height of stumps shall be in accordance with Section 201 of the Forest Service Specifications for Construction of Roads and Bridges.
  - b. Stable trees up to 6 inches diameter breast height (DBH) need not be cut if they will not interfere with back slope stability.
  - c. Stumps and brush may be left in place except that all stumps that protrude from excavated banks, or that have the potential to become dislodged at any later date, shall be removed.
4. All overburden, clearing, merchantable timber, grubbing debris shall be disposed of or stockpiled for later use as shown on the Pit and Quarry Development Plans.
5. All dead trees and snags which are sufficiently tall to reach the work area shall be felled.
6. The pit or quarry shall be left in a neat, orderly and well-drained condition. All overhangs and loose rock shall be removed. Rock, loosened by blasting operations, shall be scaled from the faces prior to leaving the site.
7. After excavation is complete, the area shall be cleaned up and left as shown on the quarry development plan. Any access road will be treated as shown on drawings or quarry releases.

Activity: Road and Bridge Construction/Reconstruction

NAS Code: LT22

I. General Direction - Construction (Incorporate by reference FSH 7709.57)

Construct forest development roads and bridges.

II. General Direction - Reconstruction (Incorporate by reference FSH 7709.11 Chap 26)

A. Reconstruction of roads may occur to correct the following situations:

1. Correction of unsafe conditions that cannot be corrected by traffic restriction.
2. Repair of situations where use will cause environmental damage.
3. Upgrading of a facility that was not originally constructed to accommodate developed use as documented in the Road Management Objectives.



I. General Direction (Incorporate by reference FSM 7732)

- A. Maintain forest development roads in a condition to safely accommodate intended use and in accordance with maintenance criteria documented in the road management objectives. (FSM 7732.03 item 1)
- B. Require commercial users to perform maintenance commensurate with their use of forest development roads. (FSM 7732.03 item 2)
- C. Schedule and coordinate maintenance efforts of the Forest Service, contractors, commercial users, purchasers, permittees, and cooperators to accomplish work in the most efficient and cost-effective manner. (FSM 7732.03 item 3)

Standard and Guidelines

- 1. Maintain forest development roads to the following minimum maintenance levels:
  - a. Arterial roads: Level 3
  - b. Collector roads: Level 3 during scheduled activities. Level 2 at all other times.
  - c. Local roads: Level 3 during scheduled activities, Level 1 at all other times.

Reference: FSH 7709.15

RESOURCE: Log Transfer Facility

Activity: Siting

NAS Code: LT214

I. General Direction

Proper siting of log transfer and log raft storage facilities is the single most important means of controlling adverse water quality and biotic impacts from the construction and operation of these facilities. The least biologically productive and sensitive areas available which meet industry's physical and economic requirements is the preferred site.

Standards and Guidelines

- A. Proximity to Rearing and Spawning Areas: Siting of log transfer and log raft storage facilities within 300 feet of the mouths of anadromous fish streams, or in areas known to be important for fish spawning or rearing, is normally prohibited.
- B. Protected Locations: Log transfer and log raft storage facilities should be sited in weather protected waters with bottoms suitable for anchoring and with at least 20 acres for temporary log storage and log booming.
- C. Upland Facility Requirements: Log transfer facilities generally should be sited in proximity to at least five acres of relatively flat uplands. There should also be a body of water sufficient to provide a minimum of 60 lineal foot facility face.
- D. Safe Access to a Facility from the Uplands: To provide safe access to the log transfer facility and adjoining log sort yard, the facility should be sited where access roads to the facility can maintain a degree of 10% or less for trucks and 4% for specialized equipment.
- E. Bark Dispersal: Log transfer facilities should be sited along or adjacent to straits and channels or deep bays where currents may be strong enough to disperse sunken or floating wood debris. Siting log transfer facilities in embayments with sills or other natural restrictions to tidal exchange should be avoided.
- F. Site Productivity: Sites for in-water storage and/or transfer of logs should be located in areas having the least productive intertidal and subtidal zones.
- G. Sensitive Habitats: Log transfer facilities and log raft storage areas should not be sited on or adjacent to (i.e., near enough to effect) extensive tideflats, salt marshes, kelp or eelgrass beds, seaweed harvest areas or shellfish concentration areas.

- H. Safe Marine Access to Facilities: Log rafting and storage facilities should be safety accessible to tug boats with log rafts at most tides and on most winter days.
- I. Storage and Rafting: Logs, log bundles or log rafts should be stored in areas where they will not ground at low tide. A minimum depth of 40 feet or deeper measured at Mean Lower Low water (MLLW) for log raft storage is preferred.
- J. Bald Eagle Nest Trees: Site log transfer facilities to avoid bald eagle nests. No project construction or operation should be closer than 330 feet to any bald eagle nest tree.

Activity: Construction and Operation

NAS Code: LT214

I. General Direction

The following guidelines apply to the construction and operation of log transfer facilities (LTF) and collateral upland facilities such as sort yards and upland log storage areas. Construction and operation guidelines have not been developed for log raft storage facilities since the only practical means of regulation raft storage is through proper siting. The degree of application of these guidelines to individual LTFs is based on the siting of the facility.

Standards and Guidelines

- A. Log Transfer Facility Design: Log transfer facility design should be the least environmentally damaging, practicable alternative. Factors to be considered in selection of design alternatives include:
  - 1. Economic practicality
  - 2. Facility requirements
  - 3. Physical site constraints
  - 4. Timber volumes to be transferred (site usage and duration)
  - 5. Total potential effects on biota, water quality (including biological productivity and sensitivity), visual quality, and
  - 6. Other potential uses of the site and facility.
- B. Fill Structures: Fill structures shall be designed and constructed to prevent erosion, pollution and structural displacement.



- C. Timing of In-water Construction: In-water construction, blasting and/or filling associated with LTF sites should be timed to limit adverse impacts to marine and estuarine fishery resources and avoid conflicts with other user groups.
- D. Bark Accumulation Management: The siting, design and operation of the LTF and contiguous collateral upland facilities shall utilize best practicable procedures and methodologies to control intertidal and submarine accumulations of bark.
- E. Solid Waste Management: Solid waste, including wood and other solid waste generated from the LTF, contiguous and other collateral facilities shall be routinely removed from the log transfer facilities and adjacent facilities and disposed of at an approved upland solid waste disposal site.
- F. Bark Accumulations: The regulatory agency(ies) will impose an interim intertidal and submarine threshold bark accumulation level. When accumulations exceed the threshold level, cleanup -- if any -- will occur at the discretion of the permitting agency(ies). The interim threshold bark accumulation level is describes as 100% coverage exceeding both 1 acre in size and a thickness greater than 10 cm (3.9 inches) at any point.
- G. Bundle Speed: The speed of log bundles entering receiving waters should be the slowest practicable speed achievable. Decisions on the allowable transfer system that can be used will occur on site-specific basis during the permitting process.
- H. Surface Drainage Management: The design, construction and operation of LTF's, contiguous sort yards and/or log storage yards shall utilize practicable procedures for control of surface water runoff from facilities.
- I. Control of Hydrocarbons: The log transfer system and adjacent sort yard handling equipment shall be operated and maintained to minimize petroleum and lubrication products from entering waters.
- J. On-shore Log Storage: Where feasible, preference must be given to onshore storage and barging of logs.
- K. Facility Maintenance and Reclamation: The permittee shall maintain the structure or work authorized in good condition and in reasonable accordance with the approved plans and drawings. If and when the permittee desires to abandon the authorized activity herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party, the permittee must restore the area to a satisfactory condition.

I. General Direction

Log Transfer Facilities (LTF) are monitored to assure permit compliance. Information obtained as a result of monitoring is used to determine results from activities associated with the construction, operation and maintenance of the facilities and to ensure that corrective action occurs, if appropriate. The level and type of monitoring is dependent on the type of facility.

Standards and Guidelines

- A. Monitoring by Permittee: Monitoring for bark accumulations, oil sheen and surface runoff associated with the operation of log transfer facilities is the responsibility of the permittee. The regulatory agencies may, at their discretion, be responsible for some or all monitoring requirements.
- B. Monitoring Requirements: Monitoring should be undertaken at all continuous and intermittent use LTF sites, and at those occasional and incidental use LTFs at which total volume of logs transferred is similar to that of intermittent use sites. The level of monitoring and parameters to be monitored should be determined on a site-specific basis. Monitoring at occasional and incidental use facilities may be required on a site-specific basis. Monitoring of occasional or incidental use sites WILL be limited. Permittees will be required to submit a monitoring program to the permitting agencies prior to operation of a new continuous or intermittent use LTF. Agency approval of monitoring plans is required. Requirements for monitoring should be responsive to data obtained during prior monitoring activities.
- C. Annual Monitoring for Bark Accumulation: At continuous and intermittent use LTFs, monitoring of bark debris accumulation should occur prior to the operating season as a minimum requirement. Monitoring at intermittent LTFs would occur only during those periods when the LTF is active.
- D. Elements of Bark Accumulation Monitoring Program: Elements that should be included in a monitoring program for continuous and intermittent use LTFs, are site-specific and may include but not be limited to:
  - 1. Permanent transects,
  - 2. Measurements of areal extent, thickness and percent coverage bark debris,
  - 3. Parameters measurements from MHW to depths of 60 feet MLLW.

- E. Monitoring for Oil Sheen: Waters in the vicinity of an LTF shall be monitored during operations for the presence of a visible sheen and recorded, when observed.
- F. Monitoring Upland Discharges: On a case-by-case basis, discharges of rainfall runoff from the log sorting and storage yard and discharges from any settling pond used to treat water may require monitoring to ensure compliance with State Water Quality Standards and the Clean Water Act.
- G. Reporting Guidelines: Routine annual reports include the following descriptive information:
  - 1. Location of LTF. (402/404 permits require latitude and longitude; Forest Service traditionally uses legal descriptions).
  - 2. Description of LTF, including transfer devices and sorting and storage areas.
  - 3. Permit holder and/or operator of LTF.
  - 4. Starting and ending dates of operation season (from first to last bundle), and number of operating days per season.
  - 5. Gross volume in board feet (Scribner Sales) or number of bundles transferred during the operating season.
  - 6. Monitoring data described in monitoring Guidelines.



## **Appendix G**

# **Management Project Prescriptive Direction**



## Semiprimitive Nonmotorized

### Description of the Management Area

Management emphasis is for providing nonmotorized semiprimitive recreation opportunities and activities such as hiking and cross-country skiing both on and off trails, backcountry camping, hunting, fishing, viewing wildlife and the use of non-motorized boats on lakes and streams in an area closed to motorized use. Such activities and opportunities are made available away from roads and trails which are open to motorized use and areas of concentrated development or human activity; and waterways generally used by motorized boats.

The area is characterized by a predominately natural or natural appearing environment. The area provides moderate to high probability to experience independence, closeness to nature, and self reliance in an environment that offers a high to moderate degree of challenge in traveling both cross country and on constructed trails or marked waterways. Evidence of past management and use, such as historical remains of early mining or logging may be present. These may or may not be visually subordinate to the surrounding landscape, but appear to have evolved to their present state through natural processes. Current resource management activities are not visually evident or are subordinate to the characteristic landscape.

### Desired Conditions

**\*\* Recreation:** Use is managed to maintain a high to moderate probability of experiencing isolation from the sights and sounds of human activity in an environment that offers challenge and risk, particularly in the use of nonmotorized methods of travel. Concentration of users is low but there is often evidence of other users. On-site regimentation and control of use is subtle. Developed sites are rustic and facilities are primarily for resource protection.

**\*\* Visual:** All activities within the area are integrated in such a way that they are not evident to the casual observer. Landscape rehabilitation is used to restore existing landscapes to a desirable visual quality. Visual enhancement is aimed at increasing positive elements of the landscape to improve visual variety and to remove discordant elements.

**\*\* Fish:** Emphasis is on maintaining naturally appearing riparian and stream habitat conditions.

**\*\* Wildlife:** Emphasis is on maintaining naturally appearing habitat conditions and enhancing viewing opportunities.

**\*\* Timber:** Vegetative cover is managed to appear in an unaltered state.

**\*\* Soil and Water:** Land use activities are carried out in a manner which avoids adverse soil impacts and protects water quality.

**\*\* Facilities:** Recreation cabins, shelters, tent platforms or pads and other structures may be located here and are designed to complement management of the area.

**\*\* Transportation:** The transportation system within the area is primarily composed of trails and waterways. Other management activities requiring the development of non-system roads are located and designed to expand and enhance the semiprimitive recreation opportunities in the area. Aircraft access may occur.



**\*\* Fire:** Natural and human caused fires are normally suppressed but may be allowed to burn to enhance wildlife habitat conditions.

**\*\* Insect and Disease:** Integrated pest management principles are applied during project implementation to improve the health of the vegetative cover.

PRESCRIPTION DIRECTION AND STANDARDS AND GUIDELINES

RESOURCE: Recreation

Activity: Recreation Use Administration NAS Code: AN122

I. General Direction - General Recreation Management and Operations

- A. Manage for Semiprimitive Nonmotorized recreation opportunities and appropriate activities throughout the Prescription Area, unless specifically closed to public use.
- B. Use of motorized equipment and use of explosives is permitted for construction and maintenance of facilities.

RESOURCE: Visuals

Activity: Visual Resource Operations NAS Code: AV1

I. General Direction

- A. Visual character of the area may be in an altered appearance, however; design activities to not be evident to the casual observer utilizing natural form, line and texture found in the environment.

Standards and Guidelines

- 1. Apply Management area-wide standards and guidelines for the Retention Visual Quality Objective.
- B. Rehabilitate areas to a desirable visual character where conditions warrant.

## Semiprimitive Motorized

Management emphasis provides Semiprimitive Motorized recreation opportunities and activities such as snowmobiling, high-clearance vehicle driving or use of ATV's and motorcycling on trails and primitive roads and areas designated appropriate for these activities; and the use of motorboats on remote lakes and streams and coastal areas. Such activities and opportunities are made available away from areas of concentrated development and human activity; and heavily used waterways, but commonly occur adjacent to saltwater coastlines where seasonal motorboat use is low to moderate.

The area is characterized by a predominately natural or natural appearing environment. The area provides moderate to high probability to experience independence, closeness to nature, and self reliance in an environment that offers a high to moderate degree of challenge in traveling and operating motorized vehicles or boats. Evidence of past management and use, such as historical remains of early mining, logging may be present. These may or may not be visually subordinate to the surrounding landscape, but appear to have evolved to their present state through natural processes. Current resource management activities are not visually evident or are subordinate to the characteristic landscape.

### Desired Conditions

**\*\* Cultural resources:** Sites are protected, available for study and may be interpreted on-site.

**\*\* Recreation:** Use is managed to maintain a high to moderate probability of experiencing isolation from the sights and sounds of human activity in an environment that offers challenge and risk, particularly in the use of motorized vehicles or boats. Concentration of users is low but there is often evidence of other users. On-site regimentation and control of use is subtle. Developed sites are rustic and facilities are primarily for resource protection.

**\*\* Visual:** All activities within the area are integrated in such a way that they are not normally evident to the casual observer. Landscape rehabilitation is used to restore existing landscapes to a desirable visual quality. Visual enhancement is aimed at increasing positive elements of the landscape to improve visual variety and to remove discordant elements.

**\*\* Fish:** Emphasis is on maintaining naturally occurring riparian and stream habitat conditions.

**\*\* Wildlife:** Emphasis is on maintaining naturally occurring habitat conditions and enhancing viewing opportunities.

**\*\* Timber:** Silvicultural treatment is integrated with site and area development to provide healthy tree stands and vegetative diversity. Priority is given to maintaining or enhancing wildlife habitats and forage.

**\*\* Soil and Water:** Land use activities are carried out in a manner which avoids adverse soil impacts and protects water quality.

**\*\* Facilities:** A variety of recreation facilities such as recreation cabins or shelters may be located here and are designed to compliment management of the area.

**\*\* Transportation:** The transportation system within the area provides opportunity for use of high-clearance vehicles, trailbikes and small motorboats



and access with aircraft. Other resource management activities requiring the development of roads are located and designed to expand and enhance the semiprimitive recreation opportunities within the area. Use of roads and trails may be seasonally regulated and use may be restricted to designated travel routes.

**\*\* Fire:** Natural and human caused fires are normally suppressed but may be allowed to burn under controlled conditions to enhance wildlife habitat conditions.

**\*\* Insect and Disease:** Integrated pest management principles are applied during project implementation to improve the health of the vegetative cover.

RESOURCE: Visuals

Activity: Visual Resource Operations

NAS Code: AV1

I. General Direction

- A. Design activities to be subordinate to the characteristic landscape of the area.

Standards and Guidelines

1. Apply Management area-wide Standards and Guidelines for the Partial Retention Visual Quality Objective. This objective defines the maximum limit of allowable change to the visual character of the area; less visible evidence of activities is acceptable.

RESOURCE: Transportation

Activity: Transportation Operations

NAS Code: LT1

I. General Direction

- A. Develop and manage the transportation system to enhance motorized recreation opportunities in a predominantly natural appearing environment.

Standards and Guidelines

1. Limit the design standards of forest development roads to those commensurate with single use, low volume traffic (i.e., Traffic Service Level D).
2. Manage these roads to provide for the use of one or more of the following vehicle types:
  - \* High clearance vehicles.
  - \* All-terrain vehicles.
  - \* Snowmobiles
  - \* Motorcycles
3. Post signs informing the public that these roads are not intended for public travel by normal passenger cars.
4. Maintain only as necessary to provide passage of planned traffic and basic custodial care (i.e., Maintenance Level 2).

## Wildlife Habitat Retention

This area consists of mature forest stands, classed as late forest succession, which provide habitat for mature timber dependent wildlife and fish species. The habitat features include mature and overmature trees in a multi-layered canopy, with standing dead and down material, and with a diversity and abundance of understory shrubs, forbs, and grasses.

Emphasis in this area is maintenance and enhancement of wildlife habitat and populations in their natural conditions. Included in this is the maintenance of the chemical, physical, and biological integrity of the mature timber areas.

This prescription may be applied to areas of the Forest which do not currently have desirable mature timber habitats but may have younger stands designated to become mature timber habitat in the future.

### Desired Conditions

**\*\* Cultural resources:** Interpretation of the natural environment and the cultural resources may be provided for the visitors when compatible with management objectives.

**\*\* Recreation** use and activities are to meet the appropriate levels of social encounters and visitor impacts compatible with maintaining habitat conditions and wildlife population use of the area. Opportunities will exist for providing recreation users with a broad spectrum of opportunities including increased potential for encountering wildlife. Semi-primitive Nonmotorized and limited Semi-primitive motorized ROS classes will be the predominant classes of recreation opportunities.

**\*\* Visual** quality objectives for mature stands and second growth stands designated to become future mature stands will be retention or partial retention. The landscape will have a natural appearance.

**\*\* Wildlife and Fish** management will emphasize enhancement and maintenance of natural habitat conditions for wildlife and fish species dependent on mature timber stands. This will result in the successful reproduction and overwintering of wildlife and fish populations of emphasis species. (Younger growth stands designated to become future mature timber stands may receive vegetative treatments to encourage earlier development of mature timber habitat characteristics).

**\*\* Timber:** This area is not scheduled for timber harvesting. Vegetation will be managed consistent with other resource needs. Vegetative management will be limited to uneven-aged management in second growth and new forest stands to encourage rapid growth and early development of mature timber habitat characteristics.

**\*\* Minerals:** Material sites will be located outside this area to the extent practicable. Mineral activities are regulated to attain compatibility with management objectives.

**\*\* Facilities.** Developments requiring water access (docks, floats, boat ramps) should be located within the area where the least impact on resource values is expected to occur. Facilities will be allowed if compatible with management objectives.



**\*\* Transportation:** roads, corridors, and Log Transfer Sites will be located outside of this prescription area to the extent practicable. If transportation facilities must be located in the area, locate where the least impact is likely to occur.

**\*\* Subsistence** use will be allowed to occur in accordance with Federal and State regulations. Opportunities for harvesting mature timber related resources (such as deer and furbearers) will be maintained.

**\*\* Soil and Water:** Soil and water resources will evolve in natural mature timber condition.

**\*\* Insect and Disease:** Natural endemic levels of insects and diseases will occur in this prescription area.

RESOURCE: Visuals

Activity: Visual Resource Preparation

NAS Code: AV11

I. General Direction - Visual Quality Objective

- A. Visual Quality Objective is retention or partial retention (Refer to MA-wide standards and guidelines for specifics).

RESOURCE: Wildlife

Activity: Wildlife Habitat Planning

NAS Code: CW112

I. General Direction

- A. Younger growth stands designated to become future mature timber stands may receive vegetative treatments to encourage earlier development of mature timber habitat characteristics.

Activity: Wildlife Habitat Monitoring

NAS Code: CW121

I. General Direction

- A. Monitor the acreage of mature timber habitat lost due to catastrophic events, roads, minerals activities, etc. Evaluate the impacts of the lost acreage on the ability to attain wildlife objectives.

RESOURCE: Timber

Activity: Timber Resource Planning

NAS Code: ET112

I. General Direction

1. Generally there will be no harvest of timber other than to meet personal use (subsistence). This harvest will take only occasional scattered trees and beach logs and is not to alter the mature timber character.
2. Stabilize beach fringe areas by allowing the areas suffering blowdown to reach equilibrium to protect remaining wildlife habitat.
3. Salvage of catastrophic blowdown and insect and disease killed timber is permissible.
4. Tentatively suitable forest lands are designated unsuitable and are withdrawn from the timber base. Any timber harvest associated with salvage of blowdown or insect and disease killed timber is not chargeable to the allowable sale quantity.

RESOURCE: Soil and Water

Activity: Watershed Resource Improvements

NAS Code: FW2

I. General Direction

- A. Undertake watershed improvements where deteriorated soil and hydrologic conditions create a threat to the values for which the mature timber habitat is managed.

RESOURCE: Lands

Activity: Special Use Administration (Ncn-Recreation) NAS Code: JL122

I. General Direction

- A. Permit development activities compatible with prescription area objectives.

RESOURCE: Facilities

Activity: Facilities Construction NAS Code: LF22

I. General Direction

- A. All facilities in this area should fall under the VQO settings: Retention or Partial Retention.

RESOURCE: Transportation

Activity: Transportation Operations NAS Code: LT1

I. General Direction

- A. Designate road corridors, where necessary, to allow access for planned management activities in this or other management areas. Standards and Guidelines
1. Conduct a transportation analysis. Consider impacts to fish and wildlife and enforcement costs of road closures in the analysis.
  2. Locate, design and construct roads to minimize adverse effects on fish and wildlife. Road location and design criteria shall be developed through the interdisciplinary team process.
  3. If need is determined during project interdisciplinary team review, roads may be closed, either seasonally or yearlong, to minimize adverse effects on fish and wildlife.



## Riparian

The primary purpose of this area is to maintain optimum habitat for fish and riparian dependent wildlife species within drainages that produce high numbers of pink or chum salmon or which provide significant sportfishing opportunities. It includes the main stem stream channel and lakes as well as the floodplain and the adjacent low gradient areas which have a high probability of containing small rearing tributaries and other unidentified streams. These areas are primarily characterized by aquatic and riparian ecosystems with distinctive resource values and characteristics.

This emphasis area applies only to designated Priority 1 (High Value) watersheds. The emphasis area is defined by a combination of channel type and landform information. As a minimum, this area includes a 100 hundred foot horizontal distance from fish streams (B, C, D, or E channel types) and lake shores. The area also includes adjacent land areas that conform to the Alluvial Fans Landtype, the Low Outwash Plains Landtype, the Braided Streams Landtype, or the High Outwash Plains Landtype. These areas generally contain the large majority of high quality anadromous fish habitat.

This emphasis area is not synonymous with "Aquatic Habitat Management Unit" as defined by the Management Area-wide Standards and Guidelines.

### Desired Conditions

**\*\* Recreation** opportunities abound; however, actual use must be managed to preserve the habitat quality of the riparian area. Recreation developments should generally be located in other areas, unless the use is compatible and cannot practicably be located outside of riparian areas. Activities are designed to harmonize with the appropriate designated ROS setting and purpose of the area. Primitive I, Primitive II, Semi-primitive Nonmotorized and Semi-primitive Motorized opportunities.

**\*\* Visual** quality objectives will be either retention or partial retention and a natural appearing landscape will be maintained.

**\*\* Fish and Wildlife** resources, including their protection, rehabilitation, and enhancement will be the primary emphasis in this prescription area. Other resource management activities should assure that optimum stream conditions are maintained and that adequate vegetative conditions are available to provide high quality habitat and travel corridors for riparian dependent wildlife species.

**\*\* Timber:** Vegetative management actions will be limited and will occur only when consistent with the protection of fish and wildlife resources. Silvicultural activities will emphasize the development or maintenance of fish and wildlife habitat.

**\*\* Soil and water:** Soil and water protective measures are applied to maintain or improve water conditions or fish habitat.

**\*\* Mineral** resource development will often include special mitigating conditions due to the sensitivity of the area. Mineral material sites will normally be located outside this area unless fisheries habitat quality objectives can be met. Minerals activities will be regulated to attain compatibility with management objectives. Maintain desired water quality by

controlling effluent, solids, toxic chemicals, and/or heavy metals, that may result from mineral exploration or mining activities.

**\*\* Land** uses, such as special use, should generally be located in other areas, unless the use is compatible and cannot be located outside of riparian areas.

**\*\* Facilities** should generally be located in other areas, unless the use is compatible and cannot be located outside of riparian areas.

**\*\* Transportation** developments should be located outside of the area, to the extent practicable. Developments should not impair the production of anadromous fish or of resident sportfish populations. Road corridors should also avoid heavily used wildlife areas.

**\*\* Subsistence** use will be allowed to occur in a manner consistent with management objectives for the area and in accordance with applicable Federal and State regulations. Opportunities will be maintained for harvesting riparian related resources, including both fish and wildlife species.

RESOURCE: Recreation

Activity: Recreation Use Administration NAS Code: AN122

I. General Direction - General Recreation Management and Operations

- A. Manage recreation use to minimize/avoid the adverse effects of recreation activities on wildlife and fish resources and habitat.
- B. Provide for inventoried ROS opportunities and appropriate activities throughout the Prescription Area, unless specifically closed to public use. Where the ROS setting is changed by project implementation manage the recreation resource in accordance with the created ROS conditions.

Standards and Guidelines

- 1. Locate, design and operate only those recreation facilities which are necessary to manage existing public use of the water and shoreline areas (i.e., boat or float plane docks, launching ramps and associated access roads and trails). Locate parking, sanitation and other recreation facilities outside the Prescription Area where practical. Design all facilities within the Prescription Area to avoid adverse effects on riparian shorelines and water quality.

RESOURCE: Visuals

Activity: Visual Resource Operations NAS Code: AV1

I. General Direction

- A. A variety of visual conditions may exist within the emphasis area.

Standards and Guidelines

- 1. Visual Quality Objectives may range from Retention to Partial Retention (Refer to MA-wide standards and guidelines).

RESOURCE: Fish

Activity: Fish Habitat Planning NAS Code: CF112

I. General Direction

- A. Emphasize the protection and enhancement of fish habitat and populations. Management activities should not result in any decrease in anadromous fish, or high value resident sport fish, habitat capability.
- B. Silviculture prescriptions should insure future large woody debris (LWD) sources to maintain/enhance fisheries.

RESOURCE: Wildlife



I. General Direction

- A. Coordinate management activities with the needs of wildlife.  
Standards and Guidelines
  - 1. Use the habitat needs of MIS to help identify project locations.
  - 2. Allow for the migration and movement of wildlife along riparian areas.
- B. Coordinate vegetation management to emphasize the needs of wildlife.  
Standards and Guidelines
  - 1. Utilize silvicultural techniques which prolong understory forb and shrub production.
  - 2. Provide habitat for cavity nesting wildlife species.
    - \* Favor saving snags away from roads to reduce loss from firewood gathering activity.
- C. Coordinate road management to emphasize the needs of wildlife.  
Standards and Guidelines
  - 1. Locate and design roads to minimize human disturbance to wildlife, with particular emphasis given to brown bear habitat and deer wintering areas.
  - 2. Utilize road management including yearlong or seasonal closures to reduce human disturbance on wildlife. Particular emphasis needs to be given to road management in important brown bear riparian habitats and deer wintering areas.

RESOURCE: TimberActivity: Timber Resource PlanningNAS Code: ET112I. General Direction

- A. Suitable forest land is available for harvest and is included in the allowable sale quantity calculation.
- B. To the extent practical, limit timber harvest activities within this emphasis area.
- C. Silvicultural activities will emphasize the development or maintenance of fish & wildlife habitat.

Activity: Timber Resource CoordinationNAS Code: ET113I. General Direction

- A. Emphasize fisheries and wildlife objectives in project design, analysis, and development of NEPA documents for timber activities.
- B. Prioritize K-V funds for fish and wildlife habitat improvement projects in the Sale Area Improvement Plan.

I. General Direction

- A. Locate and design timber harvest units to insure that fish habitat, wildlife habitat, and water quality are protected.
- B. Utilize nonstandard harvest methods, if necessary, to meet fish and wildlife habitat objectives. These methods may include, but are not limited to, single tree selection, group selection, and strip harvest.

Standards and Guidelines

- 1. Where strip clearcutting is prescribed, leave strips shall have a minimum width of 300 horizontal feet.
  - C. Minimize soil and understory vegetation disturbance.
- Standards and Guidelines
- 1. Require low ground pressure yarding systems on wetter soils.
  - 2. Do not allow yarding through areas of understory vegetation that have been undisturbed by tree felling operations.

I. General Direction

- A. Precommercially thin second growth stands to increase forage production while providing some denser cover.

Standards and Guidelines

- 1. Thin to an average tree spacing between 16-20 feet.
    - 2. Maintain small (one-half acre or less) unthinned clumps of healthy trees.
  - B. Provide corridors for wildlife movement in thinned second growth stands.
- Standards and Guidelines
- 1. Designate corridors of approximately 50 feet in width.
  - 2. Lop and scatter all slash to lie within 2 feet of the ground within designated corridors.
- C. Maintain approximately 10 percent of second growth stands in openings.
- Standards and Guidelines
- 1. On initial thinning, create or maintain openings of one-half acre or less in approximately 10% of the stand.
  - 2. Lop and scatter all slash to lie within 2 feet of the ground within openings.

I. General Direction

- A. Manage activities to meet the maximum requirements to protect water quality from degradation and to protect the aquatic and

terrestrial riparian habitats, channel and streambanks, and promote floodplain stability.

Standards and Guidelines

1. Maintain and improve soil and water quality.
2. Apply Process BMPs to avoid the adverse effects from nearby land disturbance activities.
3. Monitor soil disturbance and water quality on a sample bases for management activities that disturb the soil surface to mineral material and removes vegetation.
4. Avoid the long and short-term adverse impacts to soil and water resources associated with the occupancy and modification of floodplains.

RESOURCE: Lands

Activity: Special Use Administration (Non-Recreation) NAS Code: JL122

I. General Direction

- A. Permit only those activities which are dependent upon riparian resources and do not significantly reduce the capability of the area to: (1) maintain or enhance dependent fish or wildlife habitat, or (2) protect water quality.

Standards and Guidelines

1. Analyze each new proposal on a case-by-case basis, using an interdisciplinary process, to determine probable effects.
2. Apply Managemetn Area-wide standards and guidelines for transportation operations, when granting new rights-of-way.

RESOURCE: Facilities

Activity: Facilities Improvements NAS Code: LF2

I. General Direction

- A. Permit only those facilities which do not significantly reduce the capability of the area to maintain fish or wildlife habitat or water quality.

RESOURCE: Transportation

Activity: Transportation Operations NAS Code: LT1

I. General Direction

- A. Locate, design and construct roads to minimize adverse effects on wildlife and fish habitat and populations.
- B. If need is determined, roads may be closed either seasonally or year long, to minimize adverse effects on fish and wildlife.



## Wildlife/Visual-Timber

Management decisions give equal emphasis for wildlife and visual objectives with secondary consideration for timber. These lands are most often in the foreground to middleground distance zones, and are viewed from a travel corridor, marine transportation route, or an area of moderate recreation use. All productive forest lands that are available may be scheduled for harvest.

### Desired Conditions

**\*\* Cultural** resource examination will be conducted prior to road construction or timber harvest to provide reasonable assurance that potential cultural resource values are discovered. Precise survey levels are to be determined on a case-by-case basis, taking into account the environmental characteristics of the area, conditions, type of impacting activity, and the kinds of resources that might be encountered.

**\*\* Recreation** use and activities are managed to be compatible with the area prescription, ROS setting and purpose of the area. Semi-primitive Motorized, Roaded Modified and Roaded Natural will predominate.

**\*\* Visual** quality will be emphasized along with Wildlife unless in direct conflict with wildlife objectives. In that case wildlife objectives will take precedence. Visual conditions III or IV will generally result from implementation of this prescription. Depending upon where the prescription is applied, it may or may not comply with the adopted VQO's for the affected areas.

**\*\* Wildlife** and visual resource concerns are shared. Habitat conditions are provided for most MIS, with an emphasis on Sitka black-tailed deer winter habitat. Appropriate silvicultural activities will be used to maintain a wide variety of vegetative conditions with emphasis on late successional stages.

**\*\* Fish:** Areas adjacent to important fish habitat will be protected so that no adverse affects result from management activities.

**\*\* Timber:** Timber management may occur, but is managed, consistent with an emphasis on wildlife and visual quality. Silvicultural prescriptions may include both even aged and uneven aged timber management. Silvicultural treatment is integrated with site and area development to provide healthy stands of trees, vegetative diversity, and forage production for wildlife. Management activities will not dominate the seen area, but will work with existing form, line, color and texture found in the landscape.

**\*\* Soil and Water** consideration will be provided through Best Management Practices. The emphasis will be to maintain soil cover, minimize slope failure, and reduce the degree of risk and potential affects from mass wasting associated with timber harvest and road construction.

**\*\* Transportation management:** The location of the transportation network will focus on maintaining wildlife values and their habitats while providing access for management activities. The design of the road system will incorporate and enhance appropriate motorized and/or nonmotorized recreation opportunities.

**\*\* Subsistence use** will be allowed to occur in accordance with Federal and State Regulations. Management activities will be compatible with subsistence uses.

**\*\* Minerals:** Forest lands are open to mineral entry. Access will be coordinated with timber sale road location when practicable.

**\*\* Facilities:** Permanent administrative facilities will be constructed to be compatible with the management area objective.

**\*\* Insect and Disease:** Maintain the health of the forest by applying integrated pest management principles in project design and implementation.



RESOURCE: Recreation

Activity: Recreation Use Administration

NAS Code: AN122

I. General Direction - Recreation Settings

- A. Provide Semi-Primitive to Roaded Natural recreational opportunities.

RESOURCE: Visuals

Activity: Visual Resource Operations

NAS Code: AV1

I. General Direction - Visual Quality Objective

- A. Activities will generally be evident and will often dominate the landscape. Where possible, blend activities into the natural landscape. Incorporate forms, lines, colors, and textures found in the natural landscape when designing activities.

Standard and Guidelines

Regardless of the applicable adopted VQO's, apply area-wide standard and guidelines for the Modification or, where possible, the Partial Retention VQO. Consequently, adopted VQO direction will not necessarily be met except where this prescription is applied to areas with Maximum Modification adopted VQO's.

RESOURCE: Wildlife

Activity: Wildlife Habitat Planning

NAS Code: CW112

I. General Direction

- A. Coordinate vegetative management to emphasize the needs of wildlife.

Standards and Guidelines

1. Use the habitat needs of Management Indicator Species (MIS), emphasizing Sitka black-tailed deer winter habitat requirements, to help identify the location, optimum size and layout of cutting units in a particular area.
2. Allow for the elevational migration of wildlife.
3. Use silvicultural techniques which establish and prolong understory forb and shrub production. Such techniques can include prescribed burning, precommercial thinning, permanent canopy gaps, and uneven-aged management.



4. Ensure that leave strips are windfirm, considering site specific conditions such as soils, local wind patterns, minimum 3-tree height rule, and other relevant factors.
- B. Coordinate road management to emphasize the needs of wildlife.
- Standards and Guidelines**
1. Utilize road management including yearlong or seasonal closures to reduce human disturbance on wildlife with particular emphasis given to important deer wintering areas.

RESOURCE: Timber

Activity: Timber Resource Planning NAS Code: ET112

I. **General Direction**

- A. Suitable forested land is available for harvest and is included in the allowable sale quantity calculation.
- B. Use silvicultural systems that protect or improve the habitat for most wildlife within the area.
- C. Limit clearcut harvest unit size to about 40 acres.

Activity: Timber Resource Coordination NAS Code: ET113

I. **General Direction**

- A. Emphasize wildlife and visual quality objectives in project design, analysis, and development of NEPA documents for timber activities.
- B. Prioritize K-V funds for wildlife habitat and visual quality improvement projects in the Sale Area Improvement Plan.

Activity: Timber Sale Preparation NAS Code: ET114

I. **General Direction**

- A. Location and design of timber harvest activities will consider wildlife habitat and visual quality objectives. This can be accomplished with both even-aged and uneven-aged silvicultural systems, although uneven-aged is the predominant harvest method.
  1. Design leave strips to meet vertical migration of wildlife.
  2. Maintain adequate leave strips to provide snow intercept and wildlife movement corridors until second growth stands provide these needs.
- B. Wherever possible, retain more hard snags than specified in the Forest plan, and preferably in small groupings.

- C. Retain areas of large, downed, woody debris within cutting areas to provide hiding cover for large animals.
- D. Evaluate commercial thinning opportunities in second growth stands in the prescription area for enhancing timber growth and development while improving habitat conditions for wildlife. The emphasis for all commercial thinning opportunities in this area should be to hasten the recovery of mature forest habitat for wildlife emphasis.

Activity: Reforestation

NAS Code: ET24

I. General Direction

- A. Special reforestation techniques may be required to establish or extend deciduous vegetation in the early successional stages following timber harvest for wildlife habitat enhancement.

Standards and Guidelines

- 1. Prescribed burning may be used for site preparation to delay natural coniferous regeneration.
- 2. Delay of regeneration of the commercial forest type should not extend more than 10 years.

Activity: Timber Stand Improvement

NAS Code: ET25

I. General Direction

- A. Precommercially thin second growth stands to increase forage production while providing some denser cover.

Standards and Guidelines

- 1. Prioritize precommercial thinning in stands by wildlife habitat needs and stand site index.
- 2. Take animal damage control measures only in extreme problem areas.
- 3. Thin to an average tree spacing between 16-20 feet.
- 4. Maintain small (one-half acre or less) unthinned clumps of healthy trees.

- B. Provide corridors for wildlife movement in thinned second growth stands.

Standards and Guidelines

- 1. Designate corridors of approximately 50 feet in width.
- 2. Lop and scatter all slash to lie within 2 feet of the ground within designated corridors.

- C. Maintain approximately 10 percent of second growth stands in openings.

Standards and Guidelines

- 1. On initial thinning, create or maintain openings of one-half acre or less in approximately 10% of the stand.
- 2. Lop and scatter all slash to lie within 2 feet of the ground within openings.

MATRIX CODE: 17-E-Soil and Water

Activity: Soil Inventory

NAS Code: FW1111

I. General Direction

- A. Apply base-line soil, water and channel type inventory standards where it is determined that present inventories are not applicable for project planning.

Activity: Watershed Resource Planning

NAS Code: FW112

I. General Direction

- A. Delineate on appropriate project maps the location of soil and water protection areas to insure their recognition, proper consideration, and protection on the sale area.

Standards and Guidelines

1. Designate the following features on the Sale Area Map.
  - \* Location of stream courses to be protected
  - \* Wetlands and Riparian Areas to be protected
  - \* Locations where BMPs, either Process or Standard, are to be applied with relation to road building and logging practices
  - \* Structural improvements
  - \* Any domestic or public water supply source
  - \* Other features required by Division "C" or Sale Contracts

II. General Direction

- A. Manage nondesignated domestic water use watersheds to maintain water quality standards.
- B. Manage riparian areas to protect water standards by preventing degradation of the aquatic and terrestrial riparian habitats, channel and streambanks, and promoting floodplain stability.

Standards and Guidelines

1. Identify soil and water quality requirements for the area during the environmental analysis for project level activities.
2. Apply prescribed Process or Standard BMPs to Riparian Areas to minimize the adverse effects on these areas from nearby logging and related land disturbance activities.
3. Monitor soil disturbance and water quality on a sample basis for management activities that disturb the soil surface to mineral material and removes vegetation to determine effectiveness of BMPs.
4. Avoid the long and short-term adverse impacts to soil and water resources associated with the occupancy and modification of floodplains.
5. Non designated domestic water use watersheds will be managed for multiple use while providing water suitable for human



consumption within the realm of State water quality standards and water supply regulations.

RESOURCE: Lands

Activity: Special Use Administration (Non-Recreation) NAS Code: JL122

I. General Direction

- A. Permit only those activities compatible with prescription area objectives.

Standards and Guidelines

1. Permit only activities which will encourage, or at least not interfere with, emphasized wildlife habitat or species.
2. Permit only activities which will be compatible with a Partial Retention VQO.
3. Avoid issuing new permits, or limit the duration of permits, for uses which require a more natural appearing Visual Quality Objective than Partial Retention.

Activity: Landline Location and Maintenance NAS Code: JL231, JL24

I. General Direction

- A. Provide adequate land line marking for Forest Service contractors.

Standards and Guidelines

1. Prior to Forest Service management activities, survey, mark, and post adjacent property lines, to Forest Service standards, where there is a risk of trespass.
2. These property lines will have high priority in the use of available Land Line Location funds.

RESOURCE: Facilities

Activity: Facilities Improvements NAS Code: LF2

I. General Direction

- A. Allow construction of permanent administrative facilities only where compatible with wildlife and visual quality objectives.

RESOURCE: Transportation

Activity: Transportation Operations NAS Code: LT1

I. General Direction

- A. Develop and manage the transportation system to provide access while meeting wildlife and visual quality objectives.

Standards and Guidelines

1. Locate, design and construct roads to minimize adverse effects on wildlife and visual resources.
2. If need is determined during project interdisciplinary team review, roads may be closed, either seasonally or yearlong, to minimize adverse effects on fish and wildlife.

3. Provide recreational access where appropriate.  
RESOURCE: Fire

Activity: Fire Suppression NAS Code: PF 12

Modified Protection Option (contain):

This option is to provide managers with an alternative for those lands that require a relatively high level of protection during critical burning periods. Its intent is to reduce suppression costs and increase resource benefits where possible during the entire fire season. Some portions of the fire may require aggressive action and others may only require a containment action.

## Timber/Wildlife/Visual

### Description of the Management Area

Management emphasis is for a combination of timber, fish and wildlife, recreation, and visual opportunities. Management decisions are based primarily on timber objectives. Consideration for fish, wildlife, recreation and visual needs are secondary. Where wildlife and recreation or visual objectives conflict, wildlife will prevail. Wildlife species which benefit from second growth habitat are red squirrel, longtailed vole, and orange-crowned warbler. As a rule, these lands are in low to moderate areas of public use in the middleground distance zone or seen from moderately sensitive travel routes.

### Desired Conditions

**\*\* Cultural resource:** Examinations are conducted prior to road construction or timber harvest to provide reasonable assurance that potential cultural resource values are discovered. Discovered cultural-historic-religious sites are protected.

**\*\* Recreation:** ROS managed/designed to harmonize with timber, wildlife, fish and visual objectives. Semi-primitive motorized, roaded natural, and roaded modified recreation opportunities can be provided.

**\*\* Visual:** Management activities may noticeably alter the landscape. Activities may dominate the seen area, although they will be designed for consideration of existing form, line, and texture found in the landscape. Visual conditions IV or V will result from the implementation of this prescription which, depending upon the locations to which it is applied, might or might not comply with the adapted VQO's for the affected areas.

**\*\* Fish:** Management activities will be designed to maintain or improve fish habitat.

**\*\* Subsistence:** Subsistence use will be allowed in accordance with applicable Federal and State regulations.

**\*\* Wildlife:** A wide variety of vegetative conditions, including early, middle, and late successional stages will provide a full range of wildlife habitat conditions.

**\*\* Timber:** Vegetative management is integrated with site and area development to provide healthy tree stands, vegetative diversity, and forage production for wildlife populations. Silvicultural prescriptions will include both even-aged and uneven-aged silvicultural management.

**\*\* Soil and Water:** Emphasis will be to maintain soil cover, minimize slope failure, and reduce the degree of risk and potential affects from mass wasting resulting from timber harvest and road construction.

**\*\* Minerals:** Exploration will be encouraged. Access will be coordinated with timber sale road location when practicable.

**\*\* Facilities:** Permanent administrative facilities will be constructed to be compatible with the management area objective.

**\*\* Transportation:** All suitable forested lands will eventually be accessed in association with appropriate timber harvest activities. The location of the transportation network will insure the maintenance or enhancement of wildlife habitat values.

**\*\* Fire:** Prescribed fire may be used for silvicultural site preparation, wildlife habitat improvement, and slash reduction.



**\*\* Insect and Disease:** Maintain the health of the forest by applying integrated pest management principles in project design and implementation.

RESOURCE: Recreation

Activity: Recreation Use Administration NAS Code: AN122

I. General Direction - Recreation Settings

- A. Provide a spectrum of outdoor recreation opportunities in accordance with timber, wildlife, fish and visual objectives.

Standards and Guidelines

1. Manage recreation use in a manner that is compatible with the emphasis of the area.
2. Manage the new setting(s) in accordance with the scheduled activities. Maintain the capability of the area to provide appropriate quality recreation opportunities on a sustained basis.

RESOURCE: Visuals

NAS AV11: B - D

Activity: Visual Resource Operations NAS Code: AV1

I. General Direction

- A. Activities may dominate seen areas adjacent to travel routes or use areas. Design activities to incorporate form, line and texture found in the characteristic landscape.

Standards and Guidelines

1. Regardless of the applicable adopted VQO's, apply area-wide standards and guidelines for the Modification or Maximum Modification visual quality objective. Consequently, adopted VQO direction will not necessarily be met except where this prescription is applied to areas with Maximum Modification adopted VQO's.

RESOURCE: Wildlife

Activity: Wildlife Habitat Planning NAS Code: CW112

I. General Direction

- A. Where no significant conflict with timber management objectives occurs, coordinate vegetative management to incorporate the needs of wildlife.

Standards and Guidelines

1. Use the habitat needs of MIS, emphasizing Sitka Black-tailed Deer winter habitat requirements, to help identify the

- location, optimum size and layout of cutting units in a particular area.
2. Allow for the elevational migration of wildlife.
  3. Use silvicultural techniques which establish and prolong understory forb and shrub production. Such techniques can include prescribed burning, precommercial thinning, and permanent canopy gaps.
  4. Ensure that leave strips are windfirm, considering site specific conditions such as soils, local wind patterns, minimum 3-tree height rule, and other relevant factors.
- B. Coordinate road management to emphasize the needs of fish and wildlife.

RESOURCE: Timber

Activity: Timber Resource Planning NAS Code: ET112

I. General Direction

- A. Suitable forest land is available for harvest and is included in the allowable sale quantity calculation.

Activity: Timber Sale Preparation NAS Code: ET114

I. General Direction

- A. Where no significant conflict with timber management objectives occurs, locate and design timber harvest units with consideration for wildlife habitat and visual quality objectives. This can be accomplished with both even-aged and uneven-aged silvicultural prescriptions, although even-aged is the predominant harvest method.

Standards and Guidelines

1. Design leave strips to meet elevational migration of wildlife.
  2. Design cutting unit size to provide for future forested habitat needs for wildlife.
  3. In partial cuts, maintain the tree species mix favorable for wildlife objectives.
- B. Timber harvest units are less than 100 acres. Where it is determined by an interdisciplinary analysis that exceptions to the 100 acre size limit is warranted, the actual size limitation of openings may be up to 100 percent greater (200 acres) if required due to natural biological hazards to the survival of residual trees and surrounding stands, and 50 percent greater (150 acres) for the remaining factors. Forest Supervisor will identify the particular conditions under which the larger size is warranted considering the benefits to be gained. Larger sizes are permitted on an individual timber sale basis after 60 days public notice, and review and approval by the Regional Forester.



- C. The established limits and exceptions do not apply to the size of areas harvested as a result of natural catastrophic conditions, such as insect and disease attack, or windthrow.
- D. Special consideration will be required in the design of harvest units adjacent to management areas which limit or prohibit timber activities. Where the chance of windthrow in adjacent stands is increased by timber harvest, measures will be taken to contain the windthrow within this management area.

Activity: Reforestation

NAS Code: ET24

I. General Direction

- A. Special reforestation techniques may be required to establish deciduous vegetation for wildlife habitat in the early successional stages following timber harvest.

Standards and Guidelines

- 1. Prescribed burning may be used for site preparation to delay natural coniferous regeneration when applied for wildlife habitat improvement.
- 2. Delay of regeneration of the commercial forest type should not extend more than 5 years.

Activity: Timber Stand Improvement

NAS Code: ET25

I. General Direction

- A. Precommercially thin second growth stands to improve stand characteristics for timber management objectives.

Standards and Guidelines

- 1. Thin to an average tree spacing between 12-15 feet. In areas identified as important wildlife habitat, increase tree spacing to improve wildlife browse production.
- 2. Prioritize precommercial thinning by site index. Thin stands with highest site index first.
- 3. Take animal damage control measures to reduce damage to crop trees.
- B. Provide corridors for wildlife movement in thinned second growth stands.

Standards and Guidelines

- 1. Designate corridors of approximately 50 feet in width.
- 2. Lop and scatter all slash to lie within 2 feet of the ground within designated corridors.

RESOURCE: Soil and Water

Activity: Soil Inventory

NAS Code: FW1111

I. General Direction

- A. Apply base line soil, water and channel type inventory standards where it is determined that present inventories are not applicable for project planning.

II. General Direction

- A. Manage nondesignated domestic water. Use watersheds to maintain water quality standards.
- B. Manage riparian management areas to protect water quality to meet by preventing degradation of the aquatic and terrestrial riparian habitats, channel and streambanks, and promoting floodplain stability.

Standards and Guidelines

- 1. Identify soil and water quality requirements for the area during the environmental analysis for project level activities.
- 2. Apply prescribed Process or Standard BMPs to Riparian Areas to minimize the adverse effects on these areas from nearby logging and related land disturbance activities.
- 3. Monitor soil disturbance and water quality on a sample basis for management activities that disturb the soil surface to mineral material and removes vegetation to determine effectiveness of BMPs.
- 4. Determine floodplain values and plan to avoid, where possible, the long and short-term adverse impacts to soil and water resources associated with the occupancy and modification of floodplains.
- 5. Non designated domestic water use watersheds will be managed for multiple use while providing water suitable for human consumption within the realm of State water quality standards and water supply regulations.

RESOURCE: Lands

Activity: Special Use Administration (Non-Recreation) NAS Code: JL122

I. General Direction

- A. Permit only those uses which are compatible with management area objectives.

Activity: Landline Location and Maintenance

NAS Code: JL231, JL24

I. General Direction

- A. Provide adequate land line marking for Forest Service contractors.

Standards and Guidelines

- 1. Prior to Forest Service management activities, survey, mark, and post adjacent property lines, to Forest Service standards, where there is a risk of trespass.

RESOURCE: Transportation

I. General Direction

- A. Develop and manage the transportation system to provide cost efficient access while meeting wildlife and visual quality objectives.

Standards and Guidelines

1. If need is determined, roads may be closed, either seasonally or year long, to minimize adverse effects on fish and wildlife.
2. Provide recreational access.

RESOURCE: Fire

NAS PF12: I(A:2-3)

NAS PF2: I(A:1-4)

RESOURCE: Insect and Disease

Activity: FPM Suppression Federal Lands

NAS Code: QC124-1

I. General Direction

- A. Hemlock Dwarf Mistletoe Control

Standards and Guidelines

1. Where hemlock dwarf mistletoe interferes with wildlife/visual/timber objectives, the spread of this disease should be controlled by:
  - \* Killing infected residuals at the time of harvest or precommercial thinning.
  - \* Minimizing the number of infected trees on boundaries of harvest units.
  - \* Removing infected overstory western hemlock during partial cutting or group selection.

- B. Suppression of other insects or diseases.

Standards and Guidelines

1. Where bole fluting of western hemlock threatens resource objectives, such trees should be removed during thinning, partial cutting, or group selection activities.
2. Where other pests threaten resource objectives, they should be aggressively suppressed using the most cost-effective strategies, as recommended by Pest Management specialists.



## Timber Production

The primary emphasis of this area is timber production. The primary objective is to maintain and promote industrial wood production by intensive vegetative management with sound silvicultural techniques. These lands will be managed to advance conditions favorable for the development of the timber resource and for maximum long-term timber production.

## Management Implications

- \*\* Cultural resource:** Examination and mitigation will be conducted prior to development activities to provide reasonable assurance that potential cultural resource values are protected.
- \*\* Recreation:** ROS settings are designed to harmonize with the purpose of the management area. Semi-primitive motorized, roaded natural, and roaded modified recreation opportunities can be provided.
- \*\* Visual:** The characteristic landscape will be dominated by timber harvest activities. Harvest units will be designed with consideration for existing form, line, and texture found in the landscape. Visual conditions IV or V will result from implementation of this prescription which, depending upon the locations to which it is applied, might or might not comply with the adopted VQO's for the affected areas.
- \*\* Fish:** Management activities will be designed to maintain or improve fish habitat.
- \*\* Subsistence:** Subsistence use will be allowed in accordance with applicable Federal and State regulations.
- \*\* Wildlife:** A wide variety of vegetative conditions, including early, middle, and late successional stages will provide a full range of wildlife habitat conditions.
- \*\* Timber:** Intensive vegetative management is integrated with site and area development to provide healthy tree stands. Silvicultural prescriptions may include both even aged and uneven aged timber harvest methods, although clearcutting will be the dominate method applied.
- \*\* Soil and Water:** Emphasis will be to maintain soil cover, minimize slope failure, and reduce the degree of risk and potential affects from mass wasting resulting from timber harvest and road construction.
- \*\* Minerals:** Lands are open to mineral entry. Access will be coordinated with timber sale road location when practicable.
- \*\* Facilities:** Permanent administrative facilities will be constructed to be compatible with the management area objective.
- \*\* Transportation:** All suitable forested lands will eventually be accessed in association with appropriate timber harvest activities while incorporating wildlife considerations of the management area.
- \*\* Fire:** Appropriate suppression measures will be utilized. Prescribed fire may be used for silvicultural site preparation, wildlife habitat improvement, and slash hazard reduction.
- \*\* Insect and Disease:** Maintain the health of the forest by applying integrated pest management principles in project design and implementation.

RESOURCE: Recreation

Activity: Recreation Use Administration NAS Code: AN122

I. General Direction - Recreation Settings

- A. Continue to provide the spectrum of outdoor recreation opportunities in accordance with the inherent capabilities of the Management Area.

Standards and Guidelines

1. Provide the inherent recreation settings and opportunities until scheduled activities and practices cause a change in the ROS setting(s). Manage recreation use in a manner that is compatible with the long-term objectives of the Management Area.
2. In locations where scheduled activities change the recreation setting(s), manage the new setting(s) in accordance with the appropriate ROS guidelines. Maintain the capability of the Management Area to provide appropriate quality recreation opportunities on a sustained basis.

Activity: Visual Resource Operations NAS Code: AV1

I. General Direction

- A. Timber management activities will dominate the visual character of the landscape.

Standards and Guidelines

1. Regardless of the applicable adopted VQO's, apply area-wide standards and guidelines for the Maximum Modification Visual Quality Objective. This objective defines the maximum limit of allowable change to the visual character of the area; less visible evidence of activities is acceptable. Consequently, adopted VQO direction will not necessarily be met except when this prescription is applied to areas with Maximum Modification adopted VQO's.

RESOURCE: Wildlife

Activity: Wildlife Habitat Planning NAS Code: CW112

I. General Direction

- A. Coordinate vegetation management to consider the needs of wildlife within the overall objectives of the Prescription Area.

Standards and Guidelines

1. Use the habitat needs of MIS, emphasizing Sitka Black-tailed deer winter habitat requirements, to evaluate opportunities for wildlife.

2. Provide for windfirm boundaries, considering site specific conditions such as soils, local wind patterns, minimum 3-tree height rule, and other relevant factors.



- B. Coordinate road management with the needs of wildlife where practical.

RESOURCE: Timber

Activity: Timber Resource Planning NAS Code: ET112

I. General Direction

- A. Suitable forest land is available for harvest and is included in the allowable sale quantity calculation.

Activity: Timber Resource Coordination NAS Code: ET113

I. General Direction

- A. Project design, analysis, and development of NEPA documents will emphasize timber management objectives as well as other resource considerations deemed appropriate by the responsible official.
- B. The Sale Area Improvement Plan will coordinate K-V funds for timber and other resource improvement projects. Priority will be timber management objectives.

Activity: Timber Sale Preparation NAS Code: ET114

I. General Direction

- A. Locate and design timber harvest activities primarily to meet timber management objectives. Integration of other resources objectives will be included if they do not have a significant adverse impact on timber management goals. Clearcutting is the predominant harvest method.
- B. Timber harvest units are normally less than 100 acres. Where it is determined by an interdisciplinary analysis that exceptions to the 100 acre size limit is warranted, the actual size limitation of openings may be up to 100 percent greater (200 acres) if required due to natural biological hazards to the survival of residual trees and surrounding stands, and 50 percent greater (150 acres) for the remaining factors. The Forest Supervisor will identify the particular conditions under which the larger size is warranted considering the benefits to be gained. Larger sizes are permitted on an individual timber sale basis after 60 days public notice, and review and approval by the Regional Forester.
- C. The established limits and exceptions do not apply to the size of areas harvested as a result of natural catastrophic conditions, such as insect and disease attack, or windthrow.

- D. Created openings will be adequately stocked with desirable tree species, which are approximately 5 feet in height, before the area will no longer be considered an opening for the purposes of limitations on scheduling, locations, and size of additional created openings.
- E. Special consideration will be required in the design of harvest units adjacent to management areas which limit or prohibit timber activities. Where the chance of windthrow in adjacent stands is increased by timber harvest, measures will be taken to contain the windthrow within this management area.

Activity: Timber Stand Improvement

NAS Code: ET25

I. General Direction

- A. Precommercially thin second growth stands to improve stand characteristics for timber production objectives.

Standards and Guidelines

1. Thin to an average tree spacing between 12-15 feet.
2. Take animal damage control measures to minimize damage to crop trees.
3. Prioritize precommercial thinning by site index. Thin stands with the highest site index first.

4

RESOURCE: Soil and Water

Activity: Soil Inventory

NAS Code: FW1111

I. General Direction

- A. Apply base line soil, water and channel type inventory standards where it is determined that present inventories are not applicable for project planning.

Activity: Watershed Resource Planning

NAS Code: FW112

I. General Direction

- A. Manage nondesignated domestic water use watersheds to maintain the water quality standards.
- B. Manage riparian management areas to protect water quality by preventing degradation of the aquatic and terrestrial riparian habitats, channel and streambanks, and promoting floodplain stability.

Standards and Guidelines

1. Identify soil and water quality requirements for the area during the environmental analysis for project level activities.

2. Apply prescribed Process or Standard BMPs to Riparian Areas to minimize the adverse effects on these areas from nearby logging and related land disturbance activities.
3. Determine floodplain values and plan to avoid, where possible, the long and short-term adverse impacts to soil and water resources associated with the occupancy and modification of floodplains.
4. Non designated domestic water use watersheds will be managed for multiple use while providing water suitable for human consumption within the realm of State water quality standards and water supply regulations.

Activity: Watershed Resources Monitoring

NAS Code: FW121

I. General Direction

- A. Monitor soil and water resources with relation to effect of roading and logging with applied BMPs. Apply Common standards and guidelines (NAS Code FW121) for developing and applying a monitoring plans for sale area activities.

Standards and Guidelines

1. Monitor soil disturbance and water quality on a sample basis for management activities that disturb the soil surface to mineral material and removes vegetation to determine effectiveness of BMPs.

Activity: Watershed Resource Improvements

NAS Code: FW2

I. General Direction

- A. Soil and water improvement requirement needs on nondesignated domestic water use watersheds will be done at a level to prevent degradation of water quality below standards for domestic use.

RESOURCE: Lands

Activity: Special Use Administration (Non-Recreation)

NAS Code: JL122

I. General Direction

- A. Permit only those uses which are compatible with management area objectives. Avoid issuing, or limit the duration of, permits for uses which require natural surroundings.

Activity: Landline Location and Maintenance

NAS Code: JL231, JL24

I. General Direction

- A. Provide adequate land line marking for Forest Service contractors.

Standards and Guidelines

1. Prior to Forest Service management activities, survey, mark, and post adjacent property lines, to Forest Service standards, where there is risk of trespass.





RESOURCE: Transportation

Activity: Transportation Operations

NAS Code: LT1

I. General Direction

- A. Develop and manage the transportation system to provide cost efficient access for land management activities.

Standards and Guidelines

1. If need is determined, roads may be closed, either seasonally or yearlong, to minimize adverse effects on fish and wildlife.
2. Provide recreational access where appropriate.

RESOURCE: Fire

NAS PF12: I(A:2-3)

NAS PF2: I(A:1-4)

RESOURCE: Insect and Disease

Activity: FPM Suppression Federal Lands

NAS Code: QC124-1

I. General Direction

- A. Hemlock Dwarf Mistletoe Control

Standards and Guidelines

1. Where hemlock dwarf mistletoe interferes with resource objectives, the spread of this disease should be controlled by:
  - \* Killing infected residuals at the time of harvest or precommercial thinning.
  - \* Minimizing the number of infected trees on boundaries of harvest units.
  - \* Removing infected overstory hemlock during partial cutting or group selection.

- B. Suppression of other insects or diseases.

Standards and Guidelines

1. Where bole fluting of hemlock threatens resource objectives, such trees should be removed during thinning, partial cutting, or group selection activities.
2. Where dead and dying stands of Alaska-cedar threaten resource objectives, such trees can be salvaged. Alaska-cedar can be managed without the threat of spreading this disorder to new sites because a contagious organism is not the primary cause.
3. Where other pests threaten resource objectives, they should be aggressively suppressed using the most cost-effective strategies, as recommended by Pest Management specialists.

## Road Corridors

### Management Emphasis

The primary management emphasis of the prescription is to administer access facilities.

### Area Description

These areas include roads, trails and related facilities and proposed transportation and rights-of-way corridors necessary to accommodate use for public, administrative and resource management access. These areas are managed to accommodate public and forest management transportation needs.

Sites have significant improvements located within a generally compact area while corridors are by nature linear and have limited variable width. Sites and corridors include the land directly under and immediately adjacent to the facilities. Corridors are limited in width and generally will be delineated by the clearing limits of the traveled way.

### Management Goals

The goal with this prescription is to provide necessary access between 2 or more locations within the National Forest or jointly with cooperators which will protect adjacent and intersected resources.

### Desired Conditions

**\*\* Recreation:** Dispersed recreation activities such as fishing, berry picking, Christmas tree cutting, etc. may occur with the management of this area. Opportunities for dispersed recreation will be enhanced where appropriate. Recreation activities of a highly developed nature in adjacent areas may be compatible with the management of these areas. Recreation facilities are generally outside and adjacent to this corridor. A full range of recreation opportunities, except primitive, are available.

**\*\* Visual:** Disturbance from a natural condition will generally be evident from the foreground. Adverse visual impacts, as seen from sensitive viewing corridors in the middle or background, will be minimized. Mitigation will be consistent with adopted VQOs. Within the corridor partial retention and modification will generally apply.

**\*\* Timber:** Timber on these lands may be scheduled for harvesting in conjunction with development of road routes.

**\*\* Soil and Water:** Protection will be provided for the soil and water as required under State and Federal laws. The intent is to maintain soil cover, minimize slope failure and reduce the degree of risk and potential effects from soil erosion and mass wasting.

**\*\* Transportation Management** will provide for an integrated transportation system to accommodate appropriate public need, which is consistent, with resource protection and management objectives for the area. Access projects will be coordinated with other Federal Agencies and the State of Alaska, as appropriate.



**\*\* Subsistence use will be allowed to occur in a manner consistent with the management objectives of the area and in accordance with Federal and State regulations.**

## Utility Corridors

### Management Emphasis

The primary management emphasis for this prescription is to allow for the establishment of resource and energy transmission corridors and facilities not associated with road access.

### Area Description

These areas are managed to accommodate public energy transmission needs. The areas include existing and proposed facility and utility corridors such as dams, reservoirs, generators, powerlines, pipelines and pumpstations and other rights-of-way necessary to accommodate use across National Forest land. Sites and corridors include the land directly under and immediately adjacent to the facilities. Sites have significant improvements located within a generally compact area while corridors are by nature linear and have limited variable width. Sites and corridors will generally be void of large, hazardous vegetation but may contain low lying ground vegetation.

### Management Goals

The land management goal attained with this prescription is to have corridors and sites available for resource and energy generation and transmission with minimum vegetative impact and are removed from heavier used areas.

### Desired Conditions

**\*\* Recreation:** Dispersed recreation activities such as fishing, berry picking, Christmas tree cutting, etc. will be allowed if compatible with the management objectives of these areas. Opportunities for dispersed recreation will be enhanced where appropriate. Recreation activities of a highly developed nature, are generally not compatible with the management of these areas, and will generally not be provided for. Roaded modified opportunities will generally apply.

**\*\* Visual:** Disturbance from a natural condition will generally be evident from the foreground. Adverse visual impacts, as seen from sensitive viewing corridors in the middle or background, will be minimized. Mitigation will be in accordance with adopted VQOs. Modification VQOs will generally apply.

**\*\* Timber:** Timber on these lands may be scheduled for harvesting in conjunction with development of site and utility corridors.

**\*\* Wildlife and Fish:** Fish and wildlife habitat improvement projects may occur in this area but will be consistent with the intent of this prescription. Appropriate considerations will be made to prevent or minimize wildlife and fish conflicts with other uses. The utility will not be a barrier for the cross movement of wildlife and fish through this prescription.

**\*\* Soil and Water:** Protection will be provided for the soil and water as required under State and Federal laws. This prescription will maintain soil cover, minimize slope failure and reduce the degree of risk and potential effects from soil erosion and mass wasting.

**\*\* Transportation Management** will provide for an integrated transportation system to accommodate appropriate public need in a reasonable manner, consistent with resource protection and management objectives for the area. Projects will be coordinated with other Federal Agencies, such as the Federal

Energy Regulatory Commission (FERC) or the Federal Highway Authority (FHA), and the State of Alaska, as appropriate.

**\*\* Subsistence** use will be allowed to occur in a manner consistent with the management objectives of the area and in accordance with Federal and State regulations.



## Marine Recreation

### Description of the Prescription Area

Management emphasis provides for maintaining an attractive marine recreation setting which may include facilities to enhance marine recreation opportunities. These locations are capable of providing a variety of recreation opportunities and future use may include their designation as marine recreation system units in coordination with State Marine parks. These areas include the shoreline, beach fringe, and the upland area as well as the existing anchorages and anchor buoys and have existing public use or recreation attributes that attract and support a variety of recreation uses. Activity areas, access points and support facilities are managed to maintain or enhance their long-term utility and attractiveness. Protection and enhancement of recreation settings will take precedence when potential conflict occurs.

Motorized access, primarily by boat and airplane, is common but other motorized use of the upland areas does not occur.

### Desired Conditions

**\*\* Cultural** resources, will be protected and may be interpreted.

**\*\* Recreation** use and activities are managed to harmonize with the designated ROS setting and purpose of the site. Sites may be developed to provide the necessary and appropriate facilities to provide for user health, safety, convenience and information needed to facilitate the use, enjoyment and protection of the surrounding area and resources. Primitive, and Semiprimitive Nonmotorized opportunities will be the most common ROS classes in the uplands; Semiprimitive Motorized and Roded Natural opportunities will be the most common along the shoreline and beach fringe.

**\*\* Visual** conditions will differ, based on the Adopted Visual Quality Objectives for the individual site or area. The predominant VQO's will be Retention and Partial Retention.

**\*\* Timber:** Vegetative management may be scheduled for this area. The objectives of vegetative treatment are to provide healthy stands of trees, vegetative diversity, and wildlife habitat. Insect and disease control, and vegetation management may be performed to maintain the utility and attractiveness of existing and proposed sites and adjacent areas. The priority is given to maintaining or enhancing the recreation setting.

**\*\* Transportation:** A variety of transportation systems such as developed trails are appropriate to enhance recreation use. Log transfer facilities are not generally located here.

**\*\* Facilities:** A variety of recreation facilities are appropriate including recreation cabins, shelters, anchor buoys, boat and/or float plane docks, boat ramps, tent platforms or pads, and other structures such as communication facilities and aids to navigation. Facilities will be designed to harmonize and blend with the characteristic landscape. Large scale commercial recreation facilities are usually not located in these areas.

**\*\* Fish:** Emphasis is on maintaining naturally appearing riparian and stream habitat conditions. F&W projectsx will incorporate VQO's for the area.

**\*\* Wildlife:** Emphasis is on maintaining naturally appearing habitat conditions and enhancing viewing opportunities.

**\*\* Fire:** Natural and human caused fires are normally suppressed but may be allowed to burn under controlled conditions to enhance wildlife habitat conditions.

**\*\* Insect and Disease:** Integrated pest management principles are applied during project implementation to improve the health of the vegetative cover.

## PRESCRIPTION DIRECTION AND STANDARDS AND GUIDELINES

RESOURCE: Cultural

Activity: Cultural Resource Activities

NAS Code: AC

### I. General Direction -

Develop priorities and schedule management activities to implement cultural resource inventory, evaluation, protection, interpretation and allocation within the prescribed area.

#### Standards and Guidelines

1. Identify areas requiring more intensive inventory/survey, including non-project areas.
2. Identify cultural properties to be nominated to the National Register of Historic Places.
3. Identify, classify and evaluate known cultural resources.
4. Identify cultural properties that require stabilization or other protective measures.
5. Identify opportunities for interpretation of cultural resources for public education and enjoyment.

RESOURCE: Recreation

Activity: Recreation Use Administration

NAS Code: AN122

### I. General Direction - General Recreation Management and Operations

- A. Manage for the designated ROS class which would range from Primitive to Semiprimitive Nonmotorized recreation opportunities in the uplands and Semi-primitive motorized and Roaded Natural opportunities along the shoreline and beach fringes.
- B. When locating anchor buoys, use the following criteria in addition to those found in the Forest-wide standards and guidelines (III-24) and the R-10 facilities handbook Chapter 500 - Anchor Buoys including Appendix 7, 7A.
  1. Locations should be in bays that do not provide good anchorage for small boats because of a foul bottom or are too deep or steep-sided to hold.
  2. Locations should be in areas that receive boating use but are very windy or subject to severe weather, limiting anchorage.
  3. Locations should enhance dispersed recreation opportunities.



4. Locations should not be selected where there is already good anchorage.
5. Locations should be on National Forest System lands with no conflicting, non-recreational uses in adjacent upland areas.

Activity: Visual Resource Operations

NAS Code: AV1

I. General Direction

- A. Visual character of the area may be in an altered appearance, however; design activities to not be evident to the casual observer utilizing natural form, line and texture found in the environment.

Standards and Guidelines

1. Apply Management Area-wide standards and guidelines for the Retention and Partial Retention Visual Quality Objectives. This objective defines the maximum limit of allowable change to the visual character of the area; less visible evidence of activities is acceptable.
2. Rehabilitate areas to a desirable visual character where conditions warrant.

RESOURCE: Transportation

Activity: Transportation Improvement Planning

NAS Code: LT 212

I. General Direction

- A. Designate road corridors where necessary to allow access for planned management activities in this or other management areas.

Standards and Guidelines

1. Conduct a transportation analysis to determine if other practical routes avoiding this management area exist. Consider impacts to fish and wildlife and enforcement costs of road closures in the analysis.
2. If permits for Log Transfer Facilities scheduled in other management areas cannot be obtained, sites in this management area will be considered only if no other practical alternative exists.
3. Locate, design and construct roads to minimize adverse effects on fish and wildlife. Road locations and design criteria shall be developed through the interdisciplinary team process.
4. If need is determined during project interdisciplinary team review, roads may be closed, either seasonally or yearlong, to minimize adverse effects on fish and wildlife.

## Research Natural Area

Research Natural Areas (RNA) are part of a national network of ecological areas designed for research and education, or to maintain unique examples of diversity on National Forest System lands. Research Natural Areas may be used for non-manipulative research, observation, and study. A RNA may carry out provisions of special acts, such as the Endangered Species Act or the monitoring provision of the National Forest Management Act. Proposed research natural areas require a written report with recommendations be submitted for approval by the Chief of the Forest Service. Individual management plans will be written for each Research Natural Area.

In addition to the Forest-wide Management Direction, the following Desired Resource Condition and Standards and Guidelines will apply to this area.

### Desired Resource Condition

**Recreation.** Recreational management allows only forms and levels of recreation use which do not threaten or interfere with the objectives or purposes for which the research natural area was established.

**Visual.** Visual quality objective of the area is preservation.

**Fish.** Fish habitat improvement projects must be compatible with the objectives for which the RNA was established.

**Wildlife.** Wildlife habitat improvement projects must be compatible with the objectives for which the RNA was established.

**Timber.** Proposed and designated RNA's will not be scheduled for timber harvest.

**Minerals.** RNA's will be recommended for withdrawal from mineral entry in conformance with section 204 of the Federal Land Policy and Management Act of 1976.

**Transportation.** Roads will not be permitted unless they contribute to the objectives or to the protection of the RNA.

**Fire.** Fire will be extinguished as quickly as possible utilizing techniques that maintain the character of the RNA.

**Insect and Disease.** Generally, no action taken against endemic insects, diseases, wildplants, or animals unless deemed necessary to protect the features for which the RNA was established.

**Subsistence.** These activities will be allowed which do not threaten or interfere with the objectives or purposes for which the research natural area was established.

### PRESCRIPTION DIRECTION AND STANDARDS AND GUIDELINES

RESOURCE: Recreation  
NAS AN122: I, IV, and VII

Activity: Recreation Use Administration NAS Code: AN122

I. General Direction

- A. Provide only those specific types and intensities of recreation activities and opportunities that can be accommodated without endangering or altering the natural biological processes occurring within the area.
- B. Issue appropriate Orders regulating public use within the area necessary to assure non-degradation of the natural environments for which the area has been established.

RESOURCE: Visuals

NAS AV11: I A & G

Activity: Visual Resource Operations NAS Code: AV1

I. General Direction

- A. Allow the visual character of the area to naturally evolve, with only ecological changes occurring.  
Standards and Guidelines
  - 1. Apply Forest-wide Standards and Guidelines for the Preservation Visual Quality Objective.

RESOURCE: Fish

Activity: Fish Habitat Planning NAS Code: CF112

I. General Direction

- A. Plan the construction and maintenance of fish enhancement projects only if they are compatible with the objectives for which the research natural area was established.

RESOURCE: Subsistence

NAS Subsistence: I(B,C,D,E,H)

Activity: Subsistence NAS Code:         

I. General Direction



- A. Customary and traditional subsistence uses will be allowed to continue to the extent they are compatible with the individual RNA objectives. Wood cutting is not allowed. Any additional restrictions will be identified in the individual RNA establishment reports and management reports.

MATRIX CODE: 21-E-Wildlife

Activity: Wildlife Habitat Improvement NAS Code: CW22

I. General Direction

- A. Wildlife habitat improvements are not allowed within RNA's.

Activity: Wildlife Habitat Maintenance NAS Code: CW23

I. General Direction

- A. Wildlife habitat maintenance is not allowed within RNA's.

RESOURCE: Timber

Activity: Timber Resource Planning NAS Code: ET112

I. General Direction

- A. Forested lands are classified as unsuitable and withdrawn from the timber base.

RESOURCE: Soil and Water

Activity: Watershed Resource Planning NAS Code: FW112

I. General Direction

- A. Plan the management of soil and water resources only if management is needed to meet the objectives for which the Research Natural Area was established.

Activity: Watershed Resource Improvement NAS Code: FW1

I. General Direction

- A. Soil and water improvement measures may occur if they are compatible with the objectives for which the Research Natural Area was established.

RESOURCE: Lands

NAS JL122: I, II(B&D), III, and VII

Activity: Special Use Administration (Non-Recreation) NAS Code: JL122

I. General Direction

- A. Allow only those activities which will preserve the Research Natural Area in an unmodified condition or, unless otherwise provided by law, those activities which serve research purposes. (Consult FSM 2700 and 4060)

Standards and Guidelines

1. Coordinate all special use proposals with the responsible Station Director, to ensure compatibility with research objectives.
2. Do not authorize activities which modify ecological processes.
3. Do not permit roads, fences, or signs on a Research Natural Area, unless they contribute to the management objectives or the protection of the area.
4. Do not authorize new buildings or buildings which currently exist but are unauthorized.
5. Only the Station Director, after consultation with the Forest Supervisor, can approve plans for temporary gauging stations and instrument shelters. Ensure that such plans contain provisions for tenure of the facility, actions to be taken, time limits for completion of actions, and identification of parties responsible for returning disturbed areas to a natural condition.
6. Encourage the use of Research Natural Areas by responsible scientists and educators. Refer research applicants to the responsible Station Director. The Station Director will execute permits and agreements for these uses.
7. Do not allow road or trail development or special uses of a permanent nature, except for research purposes, unless otherwise provided by law.

Activity: Land Ownership Administration

NAS Code: JL123

I. General Direction

- A. Request withdrawal from mineral entry, after establishment of a Research Natural area.

Activity: Landline Location and Maintenance

NAS Code: JL231, JL24

I. General Direction

- A. Ensure that boundaries are clearly identifiable on-the-ground. Clearly identify and monument, corners and boundary turning points, upon establishment of a Research Natural Area. (Consult FSM 4060).

Activity: Land Ownership Adjustments

NAS Code: JL26

I. General Direction

- A. Retain National Forest lands and acquire private inholdings, through exchange or purchase from willing sellers, as opportunities arise.

RESOURCE: Facilities

Activity: Facilities Improvements NAS Code: LF2

I. General Direction

- A. No permanent facilities are permitted. Consult FSM 4060 for procedures for authorizing temporary physical improvements.

RESOURCE: Transportation

Activity: Transportation Operations NAS Code: LT1

I. General Direction

- A. Roads will not be permitted.

RESOURCE: Law Enforcement

Activity: Law Enforcement Activities NAS Code: FL

I. General Direction

- A. Where a special closure is necessary to protect a Research Natural Area from harm, recommend a closure order be issued under provisions of 36 CFR 261.50. Ensure that such orders incorporate the special closure provisions of 36 CFR 261.53. (Consult FSM 4060).

RESOURCE: Insect and Disease

Activity: FPM Suppression-Federal Lands NAS Code: QC124-1

I. General Direction

- A. Suppression of forest pests.

Standards and Guidelines

1. No action will be taken to control insects or diseases unless the outbreak threatens adjacent resources or would drastically alter the natural ecological processes within the RNA.







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